A

D

E

## www.digitalkhodro.com ENGINE

# SECTION ECES ENGINE CONTROL SYSTEM C

## CONTENTS

#### MR20DE

BASIC INSPECTION6
DIAGNOSIS AND REPAIR WORK FLOW 6 Work Flow
INSPECTION AND ADJUSTMENT
BASIC INSPECTION
ADDITIONAL SERVICE WHEN REPLACING
CONTROL UNIT
CONTROL UNIT : Description
IDLE SPEED
IGNITION TIMING14 IGNITION TIMING : Description14 IGNITION TIMING : Special Repair Requirement14
ACCELERATOR PEDAL RELEASED POSITION
LEARNING
ACCELERATOR PEDAL RELEASED POSITION LEARNING : Special Repair Requirement
THROTTLE VALVE CLOSED POSITION LEARN-
ING
LEARNING : Description14 THROTTLE VALVE CLOSED POSITION
LEARNING : Special Repair Requirement

IDLE AIR VOLUME LEARNING	F G
MIXTURE RATIO SELF-LEARNING VALUE	н
CLEAR : Description	1
FUNCTION DIAGNOSIS	
ENGINE CONTROL SYSTEM	J
MULTIPORT FUEL INJECTION SYSTEM       24         System Diagram       24         System Description       24         Component Parts Location       27         Component Description       31	L
ELECTRIC IGNITION SYSTEM32System Diagram32System Description32Component Parts Location33Component Description37	N
AIR CONDITIONING CUT CONTROL       38         System Diagram       38         System Description       38         Component Parts Location       39         Component Description       43	O P
AUTOMATIC SPEED CONTROL DEVICE (ASCD)44	

System Diagram ......44

System Description ......44

Component Parts Location Component Description		
CAN COMMUNICATION		1
COOLING FAN CONTROL System Diagram System Description Component Parts Location Component Description	52 52 54	
EVAPORATIVE EMISSION SYSTEM System Diagram System Description Component Parts Location Component Description	59 59 59 62	1
INTAKE VALVE TIMING CONTROL System Diagram System Description Component Parts Location Component Description	67 67 68	
ON BOARD DIAGNOSTIC (OBD) SYSTEM Diagnosis Description Diagnosis Tool Function	73 81	1
COMPONENT DIAGNOSIS	84	
POWER SUPPLY AND GROUND CIRCUIT Diagnosis Procedure	<b>84</b> 84	
U1000, U1001 CAN COMM CIRCUIT		1
Description	87	
DTC Logic	87	
Diagnosis Procedure U1010 CONTROL UNIT (CAN) Description DTC Logic	<b>88</b> 88 88	
Diagnosis Procedure	88	
P0011 IVT CONTROL DTC Logic Diagnosis Procedure Component Inspection	89 89	F
P0102, P0103 MAF SENSOR Description DTC Logic Diagnosis Procedure Component Inspection	92 92 93	F
P0112, P0113 IAT SENSOR Description DTC Logic Diagnosis Procedure Component Inspection P0117, P0118 ECT SENSOR	<b>96</b> 96 97 98	F
Description	99	

DTC Logic99 Diagnosis Procedure
P0122, P0123 TP SENSOR102Description102DTC Logic102Diagnosis Procedure102Component Inspection104Special Repair Requirement104
P0132 HO2S1         105           Description         105           DTC Logic         105           Diagnosis Procedure         106           Component Inspection         107
P0133 HO2S1108Description108DTC Logic108Component Function Check108Diagnosis Procedure109Component Inspection111
P0134 HO2S1112Description112DTC Logic112Component Function Check112Diagnosis Procedure113Component Inspection114
P0135 HO2S1 HEATER115Description115DTC Logic115Diagnosis Procedure115Component Inspection116
P0138 HO2S2         118           Description         118           DTC Logic         118           Diagnosis Procedure         119           Component Inspection         120
P0139 HO2S2122Description122DTC Logic122Component Function Check122Diagnosis Procedure123Component Inspection124
P0141 HO2S2 HEATER126Description126DTC Logic126Diagnosis Procedure126Component Inspection128
P0171 FUEL INJECTION SYSTEM FUNC- TION

2

•

.

.:

·	_	
P0172 FUEL INJECTION SYSTEM FUNC-		
TION	133	
DTC Logic	133	
Diagnosis Procedure	134	ľ
		,
P0222, P0223 TP SENSOR		
Description		
DTC Logic		
Diagnosis Procedure		
Component Inspection		F
Special Repair Requirement	139	Ē
P0300, P0301, P0302, P0303, P0304 MIS-		-
FIRE	. 140	
DTC Logic		
Diagnosis Procedure		
•		
P0327, P0328 KS		
Description		1
DTC Logic	145	٦
Diagnosis Procedure		
Component Inspection	146	
P0335 CKP SENSOR (POS)	147	
Description		
DTC Logic		
Diagnosis Procedure		
Component Inspection		
P0340 CMP SENSOR (PHASE)	151	
Description		Ζ.
DTC Logic		_
Diagnosis Procedure Component Inspection	152	
Component Inspection	153	
P0420 THREE WAY CATALYST FUNCTION.	155	
DTC Logic		
Component Function Check		
Diagnosis Procedure		1
-		
P0444 EVAP CANISTER PURGE VOLUME		
CONTROL SOLENOID VALVE		
Description	. 159	
DTC Logic	. 159	
Diagnosis Procedure		
Component Inspection	. 160	
P0500 VSS	161	
Description		
DTC Logic		
Component Function Check	161	
Diagnosis Procedure	161	
		ļ
P0605 ECM	. 162	
Description		
DTC Logic		
Diagnosis Procedure		
	164	
P1111 IVT CONTROL SOLENOID VALVE		,
Description		ļ
DTC Logic	. 104	

Diagnosis Procedure164 Component Inspection	А
P1121 ELECTRIC THROTTLE CONTROL	
ACTUATOR	EC
Special Repair Requirement	С
P1122 ELECTRIC THROTTLE CONTROL FUNCTION	D
Description	
Component Inspection	E
P1124, P1126 THROTTLE CONTROL MO- TOR RELAY	F
Description	G
P1128 THROTTLE CONTROL MOTOR	Н
Diagnosis Procedure176	
Component Inspection	
P1143 HO2S1	J
DTC Logic	к
P1144 HO2S1	L
Component Function Check	М
P1146 HO2S2         184           Description         184           DTC Logic         184           Component Function Check         184	Ν
Diagnosis Procedure	0
P1147 HO2S2188Description188DTC Logic188Component Function Check188Diagnosis Procedure189Component Inspection190	Ρ
P1211 TCS CONTROL UNIT 192 Description	

	DTC Logic	2
	P1212 TCS COMMUNICATION LINE	3
	Diagnosis Procedure	<b>}</b> .
	DTC Logic	ļ ļ
	P1225 TP SENSOR	F ;
	DTC Logic	3
	P1226 TP SENSOR	) '
	Diagnosis Procedure200 Special Repair Requirement201	)
0	P1229 SENSOR POWER SUPPLY 202 DTC Logic	e F
	Diagnosis Procedure	
	P1564 ASCD STEERING SWITCH	0
	Diagnosis Procedure	Ļ
	P1572 ASCD BRAKE SWITCH       207         Description       207         DTC Logic       207         Diagnosis Procedure       208         Component Inspection (ASCD Brake Switch)       211         Component Inspection (ASCD Clutch Switch)       211         Component Inspection (Stop Lamp Switch)       212	, 3 Ι Δ
	P1574 ASCD VEHICLE SPEED SENSOR 213 Description	
	DTC Logic213 Diagnosis Procedure213	3 0
	P1706 PNP SWITCH       215         Description       215         DTC Logic       215         Component Function Check       215         Diagnosis Procedure       215	5 5
	P1715 INPUT SPEED SENSOR (PRIMARY SPEED SENSOR) 217 Description 217 DTC Logic 217 Diagnosis Procedure 217	, , , ,
	P1805 BRAKE SWITCH	

Description	-
DTC Logic	
Diagnosis Procedure	
Component Inspection (Stop Lamp Switch) 219	
P2122, P2123 APP SENSOR	
Description	
DTC Logic	
Diagnosis Procedure	
Component Inspection	
Special Repair Requirement	
P2127, P2128 APP SENSOR	
Description	
DTC Logic	
Diagnosis Procedure	
Component Inspection	
Special Repair Requirement 227	
P2135 TP SENSOR	
Description	
DTC Logic	
Diagnosis Procedure	
Component Inspection	
Special Repair Requirement	
P2138 APP SENSOR231	
Description	
DTC Logic	
Diagnosis Procedure	
Component Inspection	
Special Repair Requirement 234	
ASCD BRAKE SWITCH	
Description	
Component Function Check	
Diagnosis Procedure 235	
Component Inspection (ASCD Brake Switch) 237	
Component Inspection (ASCD Clutch Switch) 237	
ASCD INDICATOR	
Description	
Component Function Check	
Diagnosis Procedure	
COOLING FAN	
Description	
Component Function Check	
Diagnosis Procedure	
Component Inspection (Cooling Fan Motor) 242 Component Inspection (Cooling Fan Relay) 242	
Component inspection (Cooling Fail Helay)	
ELECTRICAL LOAD SIGNAL243	
Description243	
Diagnosis Procedure	
EVEL IN JECTOR	
FUEL INJECTOR	
Description	
Component Function Check	
Component Inspection	
	,

FUEL PUMP	246
Description	246
Component Function Check	246
Diagnosis Procedure	246
Component Inspection	248
IGNITION SIGNAL	249
Component Function Check	
Diagnosis Procedure	249
Component Inspection (Ignition Coil with Power	050
Transistor) Component Inspection (Condenser)	202
Component inspection (Condenser)	252
MALFUNCTION INDICATOR LAMP	254
Description	254
Component Function Check	
Diagnosis Procedure	254
POSITIVE CRANKCASE VENTILATION	055
Description	
	200
REFRIGERANT PRESSURE SENSOR	256
Description	
Component Function Check	256
Diagnosis Procedure	256
ECU DIAGNOSIS	
ECM	258
Reference Value	258
Wiring Diagram - ENGINE CONTROL SYSTEM	265
Fail Safe	
DTC Inspection Priority Chart	
DTC Index	
How to Set SRT_Code	
Test Value and Test Limit	275
SYMPTOM DIAGNOSIS	276

ENGINE CONTROL SYSTEM	A
NORMAL OPERATING CONDITION	EC
PRECAUTION 281	
PRECAUTIONS	С
SIONER <sup>®</sup> 281 Precaution for Procedure without Cowl Top Cover.281 On Board Diagnostic (OBD) System of Engine	D
and CVT281 General Precautions282	Ε
PREPARATION285	
PREPARATION	F
ON-VEHICLE MAINTENANCE 287	G
FUEL PRESSURE	Н
EVAPORATIVE EMISSION SYSTEM	T
SERVICE DATA AND SPECIFICATIONS (SDS)	J
SERVICE DATA AND SPECIFICATIONS	
(SDS)	K
Mass Air Flow Sensor290	L

М

Ν

0

Ρ

÷

www.digitalkhodro.com

021-62999292



www.digitalkhodro.com

[MR20DE] < BASIC INSPECTION > **1**.GET INFORMATION FOR SYMPTOM А Get the detailed information from the customer about the symptom (the condition and the environment when the incident/malfunction occurred) using the "Diagnostic Work Sheet". (Refer to EC-8, "Diagnostic Work Sheet".) ЕÇ >> GOTO22.CHECK DTC С 1. Check DTC. Perform the following procedure if DTC is displayed. 2. D Record DTC and freeze frame data. (Print them out with GST) Erase DTC. (Refer to EC-73, "Diagnosis Description".) Study the relationship between the cause detected by DTC and the symptom described by the customer. (Symptom Table is useful. Refer to EC-276, "Symptom Table".) Ε Check related service bulletins for information. 3. Is any symptom described and is any DTC detected? Symptom is described, DTC is detected>>GO TO 3. F Symptom is described, DTC is not detected>>GO TO 4. Symptom is not described, DTC is detected>>GO TO 5.  $\mathbf{3}$ .confirm the symptom G Try to confirm the symptom described by the customer (except MIL ON). Also study the normal operation and fail safe related to the symptom. Refer to EC-280, "Description" and EC-Н 269, "Fail Safe". Diagnostic Work Sheet is useful to verify the incident. Verify relation between the symptom and the condition when the symptom is detected. I >> GO TO 5. 4.CONFIRM THE SYMPTOM .1 Try to confirm the symptom described by the customer. Also study the normal operation and fail safe related to the symptom. Refer to EC-280, "Description" and EC-269. "Fail Safe". Diagnostic Work Sheet is useful to verify the incident. K Verify relation between the symptom and the condition when the symptom is detected. L >> GO TO 6. 5 PERFORM DTC CONFIRMATION PROCEDURE Perform DTC CONFIRMATION PROCEDURE for the displayed DTC, and then make sure that DTC is Μ detected again. If two or more DTCs are detected, refer to EC-271, "DTC Inspection Priority Chart" and determine trouble diagnosis order. N NOTE: Freeze frame data is useful if the DTC is not detected. · Perform Component Function Check if DTC CONFIRMATION PROCEDURE is not included on Service Manual. This simplified check procedure is an effective alternative though DTC cannot be detected during 0 this check. If the result of Component Function Check is NG, it is the same as the detection of DTC by DTC CONFIR-MATION PROCEDURE. Ρ Is DTC detected? YES >> GO TO 10. >> Check according to EC-272, "DTC Index". NO **6.** PERFORM BASIC INSPECTION

Perform EC-10, "BASIC INSPECTION : Special Repair Requirement".

< BASIC INSPECTION >

[MR20DE]

>> GO TO 7.

#### 7.DETECT MALFUNCTIONING SYSTEM BY SYMPTOM TABLE

Detect malfunctioning system according to <u>EC-276</u>, "Symptom Table" based on the confirmed symptom in step 4, and determine the trouble diagnosis order based on possible causes and symptom.

#### >> GO TO 8.

#### **8.** DETECT MALFUNCTIONING PART BY DIAGNOSIS PROCEDURE

Inspect according to Diagnosis Procedure of the system.

#### NOTE:

The Diagnosis Procedure in EC section described based on open circuit inspection. A short circuit inspection is also required for the circuit check in the Diagnosis Procedure. For details, refer to <u>GI-40, "Circuit Inspection"</u>.

Is malfunctioning part detected?

- YES >> GO TO 9.
- NO >> Monitor input data from related sensors or check the voltage of related ECM terminals. Refer to EC-258, "Reference Value".

9. REPAIR OR REPLACE THE MALFUNCTIONING PART

- 1. Repair or replace the malfunctioning part.
- 2. Reconnect parts or connectors disconnected during Diagnosis Procedure again after repair and replacement.
- 3. Check DTC. If DTC is displayed, erase it. Refer to EC-73, "Diagnosis Description".

#### >> GO TO 10.

### 10.FINAL CHECK

When DTC was detected in step 2, perform DTC CONFIRMATION PROCEDURE or Component Function Check again, and then make sure that the malfunction have been repaired securely. When symptom was described from the customer, refer to confirmed symptom in step 3 or 4, and make sure that the sum of the customer is a statement of the symptom of the symptom in step 3 or 4, and make sure that the symptom is step 3 or 4, and step 3 or 4,

that the symptom is not detected.

Is DTC detected and does symptom remain?

YES-1 >> DTC is detected: GO TO 8.

YES-2 >> Symptom remains: GO TO 6.

>> Before returning the vehicle to the customer, make sure to erase unnecessary DTC in ECM and TCM (Transmission Control Module). (Refer to <u>EC-73, "Diagnosis Description"</u>.) If the completion of SRT is needed, drive vehicle under the specific DRIVING PATTERN in <u>EC-274</u>, "How to Set <u>SRT</u> Code".

#### **Diagnostic Work Sheet**

#### DESCRIPTION

There are many operating conditions that lead to the malfunction of engine components. A good grasp of such conditions can make troubleshooting faster and more accurate.

In general, each customer feels differently about a incident. It is important to fully understand the symptoms or conditions for a customer complaint.

Utilize a diagnostic worksheet like the WORKSHEET SAMPLE below in order to organize all the information for troubleshooting. Some conditions may cause the MIL to come on steady or blink and

DTC to be detected. Examples:

Vehicle ran out of fuel, which caused the engine to misfire.



 

 WHAT
 ......
 Vehicle & engine model

 WHEN
 .....
 Date, Frequencies

 WHERE
 Road conditions

 HOW
 .....
 Operating conditions, Weather conditions, Symptoms

SEF907L

INFOID-000000004899777

www.digitalkhodro.com

< BASIC INSPECTION > WORKSHEET SAMPLE

[MR20DE]

Customer na	me MR/MS	Model & Year	VIN
Engine #		Trans.	Mileage
Incident Date	1	Manuf. Date	In Service Date
Fuel and fuel filler cap		<ul> <li>Vehicle ran out of fuel causing misfire</li> <li>Fuel filler cap was left off or incorrectly</li> </ul>	
	Startability	<ul> <li>Impossible to start</li> <li>No combust</li> <li>Partial combustion affected by th</li> <li>Partial combustion NOT affected</li> <li>Possible but hard to start</li> <li>Other</li> </ul>	hrottle position d by throttle position
Symptoms	🔲 Idling	No fast idle  Unstable  H Others [	High idle 🔲 Low idle
-	Driveability	Stumble Surge Knock Intake backfire Exhaust backfi Others [	
	Engine stall	At the time of start While idling While accelerating While dece	elerating
Incident occu	Irrence	Just after delivery      Recently     In the morning      At night	In the daytime
Frequency		All the time Under certain cond	ditions 🔲 Sometimes
Weather con	ditions	Not affected	
	Weather	Fine Raining Snowing	Others [ ]
	Temperature	Hot Warm Cool	Cotd Humid F
		Cold During warm-up	After warm-up
Engine conditions		Engine speed	4,000 6,000 8,000 rpm
Road conditions		🗌 In town 🗌 In suburbs 🗌 Hig	ghway 🔲 Off road (up/down)
Driving conditions		Not affected       While idling         At starting       While idling         While accelerating       While cruis         While decelerating       While turni         Vehicle speed       1         0       10       20	
	indicator lamp	Turned on Not turned on	

0

Ρ

М

021-62999292

<u>'</u> .

## **INSPECTION AND ADJUSTMENT**

< BASIC INSPECTION >

## **INSPECTION AND ADJUSTMENT BASIC INSPECTION**

## **BASIC INSPECTION : Special Repair Requirement**

## **1.INSPECTION START**

- 1. Check service records for any recent repairs that may indicate a related malfunction, or a current need for scheduled maintenance.
- 2. Open engine hood and check the following:
- Harness connectors for improper connections
- Wiring harness for improper connections, pinches and cut
- Vacuum hoses for splits, kinks and improper connections
- Hoses and ducts for leaks
- Air cleaner clogging
- Gasket

5.

6.

YES

NO

load.

Is any DTC detected?

- 3. Confirm that electrical or mechanical loads are not applied.
- Headlamp switch is OFF.
- Air conditioner switch is OFF.
- Rear window defogger switch is OFF.
- Steering wheel is in the straight-ahead position, etc.
- Start engine and warm it up until engine coolant temperature 4. indicator points the middle of gauge,

Ensure engine stays below 1,000 rpm.

Make sure that no DTC is displayed with GST.







>> GO TO 2.

>> GO TO 3.

2.REPAIR OR REPLACE

Repair or replace components as necessary according to corresponding Diagnostic Procedure.

#### >> GO TO 3.1

## $\mathbf{3.}$ CHECK TARGET IDLE SPEED

1. Run engine at about 2,000 rpm for about 2 minutes under no load.

## 021-62999292

www.digitalkhodro.com

[MR20DE]

INFOID:00000000489977.

www.digitalkhodro.com

INSPECTION AND ADJUSTMENT [MR20DE] < BASIC INSPECTION > Rev engine (2,000 to 3,000 rpm) two or three times under no 2. load, then run engine at idle speed for about 1 minute. А "mutuu 3. Check idle speed. For procedure, refer to EC-14, "IDLE SPEED : Special Repair Requirement". EC For specification, refer to EC-290, "Idle Speed". Is the inspection result normal? >> GO TO 10. YES C NO >> GO TO 4. x1000rpm PBIA8513. D 4. PERFORM ACCELERATOR PEDAL RELEASED POSITION LEARNING Stop engine. 1. Perform EC-14, "ACCELERATOR PEDAL RELEASED POSITION LEARNING : Special Repair Require-2. F ment". >> GO TO 5. F 5. PERFORM THROTTLE VALVE CLOSED POSITION LEARNING Perform EC-15, "THROTTLE VALVE CLOSED POSITION LEARNING : Special Repair Requirement". G >> GO TO 6. **D. PERFORM IDLE AIR VOLUME LEARNING** Н Perform EC-15, "IDLE AIR VOLUME LEARNING : Special Repair Requirement". Is Idle Air Volume Learning carried out successfully? YES >> GO TO 7. NO >> Follow the instruction of Idle Air Volume Learning. Then GO TO 4. CHECK TARGET IDLE SPEED AGAIN J Start engine and warm it up to normal operating temperature. 1. Check idle speed. 2. For procedure, refer to EC-14. "IDLE SPEED : Special Repair Requirement". K For specification, refer to EC-290. "Idle Speed". Is the inspection result normal? YES >> GO TO 10. 1 NO >> GO TO 8. **8.**DETECT MALFUNCTIONING PART Check the Following. М Check camshaft position sensor (PHASE) and circuit. Refer to EC-151, "DTC Logic". Check crankshaft position sensor (POS) and circuit. Refer to <u>EC-147</u>, "DTC Logic". Is the inspection result normal? Ν YES >> GO TO 9. >> Repair or replace. Then GO TO 4 NO 9. CHECK ECM FUNCTION 0 Substitute another known-good ECM to check ECM function. (ECM may be the cause of an incident, but 1. this is a rare case.) Р 2. Perform initialization of NATS system and registration of all NATS ignition key IDs. >> GO TO 4. **10.**CHECK IGNITION TIMING Run engine at idle.

## INSPECTION AND ADJUSTMENT

#### www.digitalkhodro.com

[MR20DE]

#### < BASIC INSPECTION >

- Check ignition timing with a timing light.
   For procedure, refer to <u>EC-14, "IGNITION TIMING : Special</u> <u>Repair Requirement"</u>,
   For specification, refer to <u>EC-290, "Ignition Timing"</u>.
  - 1 : Timing indicator
- Is the inspection result normal?

  - NO >> GO TO 11.



11. PERFORM ACCELERATOR PEDAL RELEASED POSITION LEARNING

- 1. Stop engine.
- Perform <u>EC-14</u>, "ACCELERATOR PEDAL RELEASED POSITION LEARNING : Special Repair Requirement".

>> GO TO 12.

12.PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Perform EC-15, "THROTTLE VALVE CLOSED POSITION LEARNING : Special Repair Requirement".

>> GO TO 13.

**13.**PERFORM IDLE AIR VOLUME LEARNING

Perform EC-15. "IDLE AIR VOLUME LEARNING : Special Repair Requirement".

Is Idle Air Volume Learning carried out successfully?

YES >> GO TO 14.

NO >> Follow the instruction of Idle Air Volume Learning. Then GO TO 4.

14. CHECK TARGET IDLE SPEED AGAIN

- 1. Start engine and warm it up to normal operating temperature.
- 2. Check idle speed.

For procedure, refer to <u>EC-14. "IDLE SPEED : Special Repair Requirement"</u>. For specification, refer to <u>EC-290. "Idle Speed"</u>.

Is the inspection result normal?

- YES >> GO TO 15.
- NO >> GO TO 17.

15. CHECK IGNITION TIMING AGAIN

1. Run engine at idle.

 Check ignition timing with a timing light. For procedure, refer to <u>EC-14. "IGNITION TIMING : Special</u> <u>Repair Requirement"</u>. For specification, refer to <u>EC-290, "Ignition Timing"</u>.

1 : Timing indicator

is the inspection result normal?

YES >> GO TO 19. NO >> GO TO 16.



## 16. CHECK TIMING CHAIN INSTALLATION

Check timing chain installation. Refer to EM-165, "Removal and Installation".

Is the inspection result normal?

YES >> GO TO 17.

NO >> Repair the timing chain installation. Then GO TO 4.

#### 021-62999292

•

-

.

## INSPECTION AND ADJUSTMENT

www.digitalkhodro.com

< BASIC INSPECTION >	[MR20DE]
17. DETECT MALFUNCTIONING PART	
Check the following. Check camshaft position sensor (PHASE) and circuit. Refer to <u>EC-151, "DTC Logic"</u> .	
Check crankshaft position sensor (POS) and circuit. Refer to <u>EC-147. "DTC Logic"</u> . the inspection result normal?	
YES >> GO TO 18. NO >> Repair or replace. Then GO TO 4	
8. CHECK ECM FUNCTION	<b>a</b> !
Substitute another known-good ECM to check ECM function. (ECM may be the cause of a	n incident, but
this is a rare case.) Perform initialization of NATS system and registration of all NATS ignition key IDs.	
>> GO TO 4.	÷
9.INSPECTION END	ą.
ECM is replaced during this BASIC INSPECTION procedure, go to EC-13. "ADDITIONAL SEI EPLACING CONTROL UNIT : Special Repair Requirement".	RVICE WHEN
DDITIONAL SERVICE WHEN REPLACING CONTROL UNIT	
DDITIONAL SERVICE WHEN REPLACING CONTROL UNIT : Description	NFCID:000000004899778
hen replacing ECM, this procedure must be performed.	
DDITIONAL SERVICE WHEN REPLACING CONTROL UNIT : Special R uirement	epair Re-
PERFORM INITIALIZATION OF NATS SYSTEM AND REGISTRATION OF ALL NATS IGNIT	ION KEY IDS
efer to SEC-7, "System Diagram".	
>> GO TO 2. PERFORM ACCELERATOR PEDAL RELEASED POSITION LEARNING	,
efer to EC-14, "ACCELERATOR PEDAL RELEASED POSITION LEARNING : Special Repair I	Requirement".
>> GO TO 3.	
PERFORM THROTTLE VALVE CLOSED POSITION LEARNING	
efer to EC-15, "THROTTLE VALVE CLOSED POSITION LEARNING : Special Repair Require	<u>ment"</u> .
>> GO TO 4.	
PERFORM IDLE AIR VOLUME LEARNING	
efer to EC-15, "IDLE AIR VOLUME LEARNING : Special Repair Requirement".	
>> END DLE SPEED	
DLE SPEED : Description	INFOID:0000000004899780
his describes how to check the idle speed. For the actual procedure, follow the instructio	ns in "BASIC

## INSPECTION AND ADJUSTMENT

< BASIC INSPECTION >

IDLE SPEED : Special Repair Requirement

1.CHECK IDLE SPEED

With GST

Check idle speed with Service \$01 of GST.

>> INSPECTION END

**IGNITION TIMING : Description** .

This describes how to check the ignition timing. For the actual procedure, follow the instructions in "BASIC INSPECTION".

IGNITION TIMING : Special Repair Requirement

### **1.**CHECK IGNITION TIMING

- 1. Attach timing light to the ignition coil No.4 harness.
- 2. Check ignition timing.
  - : Timing indicator
  - >> INSPECTION END

ACCELERATOR PEDAL RELEASED POSITION LEARNING

#### ACCELERATOR PEDAL RELEASED POSITION LEARNING : Description INFOLD COMMONNERS 704

Accelerator Pedal Released Position Learning is a function of ECM to learn the fully released position of the accelerator pedal by monitoring the accelerator pedal position sensor output signal. It must be performed each time harness connector of accelerator pedal position sensor or ECM is disconnected.

#### ACCELERATOR PEDAL RELEASED POSITION LEARNING : Special Repair Requirement

## **1**.START

- 1. Make sure that accelerator pedal is fully released.
- 2. Turn ignition switch ON and wait at least 2 seconds.
- 3. Turn ignition switch OFF and wait at least 10 seconds.
- 4. Turn ignition switch ON and wait at least 2 seconds.
- 5. Turn ignition switch OFF and wait at least 10 seconds.

#### >> END THROTTLE VALVE CLOSED POSITION LEARNING

THROTTLE VALVE CLOSED POSITION LEARNING : Description

INFOID:00000004899785

Throttle Valve Closed Position Learning is a function of ECM to learn the fully closed position of the throttle valve by monitoring the throttle position sensor output signal. It must be performed each time harness connector of electric throttle control actuator or ECM is disconnected.

## www.digitalkhodro.com

## [MR20DE]

## INFOID 00000004899782

INFOID.000000004899783

021-62999292



(NEOID-00000000489978

1.

2. 3. www.digitalkhodro.com

#### INSPECTION AND ADJUSTMENT [MR20DE] < BASIC INSPECTION > THROTTLE VALVE CLOSED POSITION LEARNING : Special Repair Requirement INFOID:000000004899787 А 1.START EC Make sure that accelerator pedal is fully released. Turn ignition switch ON. Turn ignition switch OFF and wait at least 10 seconds. Make sure that throttle valve moves during above 10 seconds by confirming the operating sound. C >> END IDLE AIR VOLUME LEARNING D IDLE AIR VOLUME LEARNING : Description INFOID:000000004899788 Ε Idle Air Volume Learning is a function of ECM to learn the idle air volume that keeps each engine idle speed within the specific range. It must be performed under any of the following conditions: • Each time electric throttle control actuator or ECM is replaced. F Idle speed or ignition timing is out of specification. IDLE AIR VOLUME LEARNING : Special Repair Requirement INFOID:000000004899785 G **1.**PRECONDITIONING Make sure that all of the following conditions are satisfied. Learning will be cancelled if any of the following conditions are missed for even a moment. н Battery voltage: More than 12.9V (At idle) Engine coolant temperature: 70 - 100°C (158 - 212°F) PNP switch: ON · Electric load switch: OFF (Air conditioner, headlamp, rear window defogger) - For vehicles equipped with daytime light systems, perform one of the following procedures before starting engine not to illuminate headlamps. Apply parking brake Set lighting switch to the 1st position Steering wheel: Neutral (Straight-ahead position) Κ Vehicle speed: Stopped Transmission: Warmed-up - CVT models Drive vehicle for 10 minutes. L >> GO TO 2.

2. IDLE AIR VOLUME LEARNING

#### NOTE:

- It is better to count the time accurately with a clock.
- Ν It is impossible to switch the diagnostic mode when an accelerator pedal position sensor circuit has a malfunction.
- Perform Accelerator Pedal Released Position Learning. Refer to EC-14. "ACCELERATOR PEDAL 1. RELEASED POSITION LEARNING : Special Repair Requirement".
- Perform Throttle Valve Closed Position Learning. Refer to EC-15. "THROTTLE VALVE CLOSED POSI-2. TION LEARNING : Special Repair Requirement".
- 3. Start engine and warm it up to normal operating temperature.
- Turn ignition switch OFF and wait at least 10 seconds. 4.
- Confirm that accelerator pedal is fully released, turn ignition switch ON and wait 3 seconds. 5.
- Repeat the following procedure quickly five times within 5 seconds. 6.
- Fully depress the accelerator pedal.
- Fully release the accelerator pedal.
- 7. Wait 7 seconds, fully depress the accelerator pedal and keep it for approx. 20 seconds until the MIL stops blinking and turned ON.
- Fully release the accelerator pedal within 3 seconds after the MIL turned ON. 8.

М

Ω

P

## INSPECTION AND ADJUSTMENT

www.digitalkhodro.com

[MR20DE]

#### < BASIC INSPECTION >

- 9. Start engine and let it idle.
- 10. Wait 20 seconds.



#### >> GO TO 3.

## 3. CHECK IDLE SPEED AND IGNITION TIMING

Rev up the engine two or three times and make sure that idle speed and ignition timing are within the specifications. For specification, refer to EC-290, "Idle Speed" and EC-290, "Ignition Timing".

Is the inspection result normal?

YES >> INSPECTION END

NO >> GO TO 4.

4.DETECT MALFUNCTIONING PART

#### Check the following

- Check that throttle valve is fully closed.
- Check PCV valve operation.
- Check that downstream of throttle valve is free from air leakage.

Is the inspection result normal?

YES >> GO TO 5. NO

>> Repair or replace malfunctioning part.

#### **5.**DETECT MALFUNCTIONING PART

Engine component parts and their installation condition are questionable. Check and eliminate the cause of the incident.

If any of the following conditions occur after the engine has started, eliminate the cause of the incident and perform Idle Air Volume Learning all over again:

Engine stalls.

Erroneous idle.

>> INSPECTION END MIXTURE RATIO SELF-LEARNING VALUE CLEAR

MIXTURE RATIO SELF-LEARNING VALUE CLEAR : Description

INFOID:000000004899790

This describes how to erase the mixture ratio self-learning value. For the actual procedure, follow the instructions in "Diagnosis Procedure".

MIXTURE RATIO SELF-LEARNING VALUE CLEAR : Special Repair Requirement

INFOID:000000004899791 .

### 1.START

- 1. Start engine and warm it up to normal operating temperature.
- 2. Turn ignition switch OFF.
- 3. Disconnect mass air flow sensor harness connector.
- 4. Restart engine and let it idle for at least 5 seconds.
- 5. Stop engine and reconnect mass air flow sensor harness connector.
- 6. Check DTC. Make sure DTC P0102 is detected.
- 7. Erase the DTC P0102.

## INSPECTION AND ADJUSTMENT

www.digitalkhodro.com

## [MR20DE]

А

EC

С

D

Е

F

G

Н

L

J

Κ

L

M

Ν

0





## نىركت ديجيتال خودرو سامانه (مسئوليت محدود

ولین سامانه دیجیتال تعمیر کاران خودرو در ایران

• •

• .

P

## ENGINE CONTROL SYSTEM

< FUNCTION DIAGNOSIS >

www.digitalkhodro.com M

[MR20DE]

## FUNCTION DIAGNOSIS ENGINE CONTROL SYSTEM

## System Diagram

INFOID:000000004899792



## **ENGINE CONTROL SYSTEM**

www.digitalkhodro.com

[MR20DE]

< FUNCTION DIAGNOSIS >

INFO(D-000000004899794

#### System Description

## INFOID:000000004899793

A

ECM performs various controls such as fuel injection control and ignition timing control.

#### **Component Parts Location**



10. ECM

solenoid valve

- 13. EVAP canister purge volume control
- 11. Mass air flow sensor (with intake air temperature sensor)
- 12. Electric throttle control actuator (with built in throttle position sensor and throttle control motor)
- N

0

P

M



ECM 1.

IPDM E/R 2.

Fuel pump fuse (15A) 3.

021-62999292



## **ENGINE CONTROL SYSTEM**

## www.digitalkhodro.com

#### [MR20DE]

MBIA0342ZZ





1. Electric throttle control actuator 2. Throttle valve (with built-in position sensor, throttle control motor)



- 1. EVAP canister purge volume control 2. solenoid valve
- Mass air flow sensor (with intake air temperature sensor)



1. Camshaft position sensor (PHASE) 2. Engine coolant temperature sensor



 
 PCV value
 2.
 Ignition coil (with power transistor)
 3.
 Fuel injector and spark plug

021-62999292



## **ENGINE CONTROL SYSTEM**

## www.digitalkhodro.com



А

EC

С

D

Е

F

G

Н

Κ

L

М

Ν

0

Ρ



## www.digitalkhodro.com

#### [MR20DE]

JMBIA0454ZZ

JMB1A0349ZZ



- JMB:A0348Z2
  - Accelerator pedal position sensor



- ASCD clutch switch 1.
- 2. Data link connector

#### 021-62999292



## ENGINE CONTROL SYSTEM .

## www.digitalkhodro.com

#### [MR20DE] < FUNCTION DIAGNOSIS > A ര EC С JMBIA1328Z D Fuel level sensor unit and fuel pump Fuel level sensor unit and fuel pump 2. Fuel pressure regulator 3. 4. hamess connector : Vehicle front E Component Description INFOID:000000004899795 F Reference Component EC-221, "Description" Accelerator pedal position sensor G ASCD brake switch EC-207, "Description" ASCD steering switch EC-204. "Description" ASCD vehicle speed sensor EC-213. "Description" Н Camshaft position sensor (PHASE) EC-151, "Description" ÷ EC-147, "Description" Crankshaft position sensor (POS) EC-240, "Description" Cooling fan motor EC-167. "Description" ÷ Electric throttle control actuator Engine coolant temperature sensor EC-99, "Description" EC-159, "Description" EVAP canister purge volume control solenoid valve Fuel injector EC-244. "Description" K EC-246, "Description" Fuel pump EC-105, "Description" Heated oxygen sensor 1 EC-115, "Description" Heated oxygen sensor 1 heater Ľ EC-118, "Description" Heated oxygen sensor 2 EC-126. "Description" Heated oxygen sensor 2 heater Ignition coil (with power transistor) EC-249, "Description" Μ EC-96, "Description" Intake air temperature sensor Intake valve timing control solenoid valve EC-164, "Description" Ν EC-145, "Description" Knock sensor EC-92, "Description" Mass air flow sensor Park/neutral position (PNP) switch EC-215, "Description" 0 PCV valve EC-255, "Description" Refrigerant pressure sensor EC-256, "Description" р EC-218. "Description" Stop lamp switch EC-176, "Description" Throttle control motor EC-173, "Description" Throttle control motor relay EC-102, "Description" Throttle position sensor

#### < FUNCTION DIAGNOSIS >

## MULTIPORT FUEL INJECTION SYSTEM

### System Diagram

Crankshaft position sensor (POS)	Engine speed <sup>12</sup> & Piston position	1	
Camshaft position sensor (PHASE)	· ·	1	
Mass air flow sensor	Amount of Intake air	•	
Intake air temperature sensor	Intake air temperature	•	
Engine coolant temperature sensor	Engine coolant temperature	<b>,</b>	
Heated oxygen sensor 1	Density of oxygen In exhaust gas		
Throttle position sensor	Throttle position		Fuel Injection &
Accelerator pedal position sensor	Accelerator pedal position		mixture ratio
Park/neutral position (PNP) switch	Gear position	ECM	Fuel injector
Battery	Battery voltage <sup>*2</sup>		
	Engine knocking condition	·	
Knock sensor		*	· · ·
Heated oxygen sensor 2"	Density of oxygen in exhaust gas	•	
EPS control unit	Power steering operation	▶	
ABS actuator and electric unit (control unit)	Vehicle speed	•	
BCM	Air conditioner operation	•	

ECM determines the start signal status by the signals of engine speed and battery voltage.
 This signal is sent through CAN communication line.

## System Description

## INPUT/OUTPUT SIGNAL CHART

Sensor	Input Signal to ECM	ECM function	Actuator	
Crankshaft position sensor (POS)	Engine speed*3		· · · ·	
Camshaft position sensor (PHASE)				
Mass air flow sensor	Amount of intake air		Fuel injector	
Intake air temperature sensor	Intake air temperature	- ·		
Engine coolant temperature sensor	Engine coolant temperature			
Heated oxygen sensor 1	Density of oxygen in exhaust gas			
Throttle position sensor	Throttle position			
Accelerator pedal position sensor	Accelerator pedal position	Fuel injection		
Park/neutral position (PNP) switch	Gear position	control		
Battery	Battery voltage*3	_		
Knock sensor	Engine knocking condition	_		
Heated oxygen sensor 2*1	Density of oxygen in exhaust gas			
EPS control unit	Power steering operation* <sup>2</sup>			
ABS actuator and electric unit (control unit)	Vehicle speed*2			
BCM	Air conditioner operation* <sup>2</sup>			

\*1: This sensor is not used to control the engine system under normal conditions.

\*2: This signal is sent to the ECM through CAN communication line.

\*3: ECM determines the start signal status by the signals of engine speed and battery voltage.

## 021-62999292

## 021-62999292

www.digitalkhodro.com

[MR20DE]

INFOID:000000004899796

JMBIA1320GE

INFOID:000000004899797

www.digitalkhodro.com

< FUNCTION DIAGNOSIS > [MR20DE]	
SYSTEM DESCRIPTION The amount of fuel injected from the fuel injector is determined by the ECM. The ECM controls the length of	А
time the valve remains open (injection pulse duration). The amount of fuel injected is a program value in the ECM memory. The program value is preset by engine operating conditions. These conditions are determined by input signals (for engine speed and intake air) from the crankshaft position sensor (POS), camshaft position sensor (PHASE) and the mass air flow sensor.	EC
VARIOUS FUEL INJECTION INCREASE/DECREASE COMPENSATION In addition, the amount of fuel injected is compensated to improve engine performance under various operat- ing conditions as listed below.	с
<fuel increase=""> <ul> <li>During warm-up</li> <li>When starting the engine</li> <li>During acceleration</li> </ul></fuel>	D
<ul> <li>Hot-engine operation</li> <li>When selector lever is changed from N to D (CVT models)</li> <li>High-load, high-speed operation</li> </ul>	E
<fuel decrease=""> <ul> <li>During deceleration</li> <li>During high engine speed operation</li> </ul></fuel>	F
MIXTURE RATIO FEEDBACK CONTROL (CLOSED LOOP CONTROL)	G
CLOSED LOOP CONTROL	Н
Feedback signal Heated oxygen Combustion Engine	-
PEIB2:53E	Ŀ
The mixture ratio feedback system provides the best air-fuel mixture ratio for driveability and emission control. The three way catalyst (manifold) can then better reduce CO, HC and NOx emissions. This system uses heated oxygen sensor 1 in the exhaust manifold to monitor whether the engine operation is rich or lean. The ECM adjusts the injection pulse width according to the sensor voltage signal. For more information about heated oxygen sensor 1, refer to EC-105, "Description". This maintains the mixture ratio within the range of	К
stoichiometric (ideal air-fuel mixture). This stage is referred to as the closed loop control condition. Heated oxygen sensor 2 is located downstream of the three way catalyst (manifold). Even if the switching characteristics of heated oxygen sensor 1 shift, the air-fuel ratio is controlled to stoichiometric by the signal	<b>L</b>
<ul> <li>from heated oxygen sensor 2.</li> <li>Open Loop Control The open loop system condition refers to when the ECM detects any of the following conditions. Feedback</li></ul>	М
control stops in order to maintain stabilized fuel combustion. <ul> <li>Deceleration and acceleration</li> <li>High-load, high-speed operation</li> </ul>	Ν
<ul> <li>Malfunction of heated oxygen sensor 1 or its circuit</li> <li>Insufficient activation of heated oxygen sensor 1 at low engine coolant temperature</li> <li>High engine coolant temperature</li> <li>During warm-up</li> <li>After shifting from N to D (CVT models)</li> <li>When starting the engine</li> </ul>	O P
MIXTURE RATIO SELF-LEARNING CONTROL The mixture ratio feedback control system monitors the mixture ratio signal transmitted from heated oxygen sensor 1. This feedback signal is then sent to the ECM. The ECM controls the basic mixture ratio as close to the theoretical mixture ratio as possible. However, the basic mixture ratio is not necessarily controlled as orig- inally designed. Both manufacturing differences (i.e., mass air flow sensor hot wire) and characteristic changes during operation (i.e., fuel injector clogging) directly affect mixture ratio.	

#### < FUNCTION DIAGNOSIS >

### www.digitalkhodro.com

#### [MR20DE]

Accordingly, the difference between the basic and theoretical mixture ratios is monitored in this system. This is then computed in terms of "injection pulse duration" to automatically compensate for the difference between the two ratios.

"Fuel trim" refers to the feedback compensation value compared against the basic injection duration. Fuel trim includes short term fuel trim and long term fuel trim.

"Short term fuel trim" is the short-term fuel compensation used to maintain the mixture ratio at its theoretical value. The signal from heated oxygen sensor 1 indicates whether the mixture ratio is RICH or LEAN compared to the theoretical value. The signal then triggers a reduction in fuel volume if the mixture ratio is rich, and an increase in fuel volume if it is lean.

"Long term fuel trim" is overall fuel compensation carried out long-term to compensate for continual deviation of the short term fuel trim from the central value. Such deviation will occur due to individual engine differences, wear over time and changes in the usage environment.

#### FUEL INJECTION TIMING



Two types of systems are used.

- Sequential Multiport Fuel Injection System
- Fuel is injected into each cylinder during each engine cycle according to the firing order. This system is used when the engine is running.
- Simultaneous Multiport Fuel Injection System Fuel is injected simultaneously into all four cylinders twice each engine cycle. In other words, pulse signals of the same width are simultaneously transmitted from the ECM.
  - The four injectors will then receive the signals two times for each engine cycle.

This system is used when the engine is being started and/or if the fail-safe system (CPU) is operating.

#### FUEL SHUT-OFF

Fuel to each cylinder is cut off during deceleration, operation of the engine at excessively high speeds or operation of the vehicle at excessively high speeds.

www.digitalkhodro.com

[MR20DE]

#### < FUNCTION DIAGNOSIS >

## **Component Parts Location**





## MULTIPORT FUEL INJECTION SYSTEM

### < FUNCTION DIAGNOSIS >

## [MR20DE]

www.digitalkhodro.com



1. Electric throttle control actuator 2. Throttle valve (with built-in position sensor, throttle control motor)



1. EVAP canister purge volume control 2. solenoid valve

Mass air flow sensor (with intake air temperature sensor)



1. Carnshaft position sensor (PHASE) 2. Engine coolant temperature sensor



1. PCV valve

 Ignition coil (with power transistor) 3. and spark plug

Fuel injector

## .

## 021-62999292

## **MULTIPORT FUEL INJECTION SYSTEM**

www.digitalkhodro.com

#### < FUNCTION DIAGNOSIS >

[MR20DE]



## MULTIPORT FUEL INJECTION SYSTEM

## www.digitalkhodro.com

#### < FUNCTION DIAGNOSIS >

[MR20DE]



- 1. Heated oxygen sensor 1 harness connector
- 2. Heated oxygen sensor 1
- 3. Heated oxygen sensor 2

4. Heated oxygen sensor 2 hamess connector



- ASCD steering switch
   SET/COAST switch
- CANSEL switch
   MAIN switch
- 3. RESUME/ACCCELERATE switch



- 1. Stop lamp switch
- 2. ASCD brake switch
- 3. Accelerator pedal position sensor



1. ASCD clutch switch

2. Data link connector

#### 021-62999292

EC-30

## MULTIPORT FUEL INJECTION SYSTEM

#### < FUNCTION DIAGNOSIS >

Heated oxygen sensor 2

Mass air flow sensor

Throttle position sensor

Knock sensor

Intake air temperature sensor

Park/neutral position (PNP) switch

[MR20DE]

www.digitalkhodro.com

#### A ദ EC O С JMBIA1326ZZ D Fuel level sensor unit and fuel pump 2. Fuel pressure regulator Fuel level sensor unit and fuel pump 3. 1. hamess connector : Vehicle front Ε **Component Description** INFQID:000000004899799 F Reference Component Accelerator pedal position sensor EC-221, "Description" G EC-151, "Description" Camshaft position sensor (PHASE) EC-147, "Description" Crankshaft position sensor (POS) EC-99, "Description" Engine coolant temperature sensor Н EC-244, "Description" Fuel injector EC-105, "Description" Heated oxygen sensor 1

EC-118. "Description" EC-96. "Description"

EC-145, "Description"

EC-92, "Description"

EC-215, "Description"

EC-102, "Description"

021	1_6	:20	00	20	2
02	1-U	23	33	23	2

Κ

L

Μ

Ν

0

P

## ELECTRIC IGNITION SYSTEM

#### < FUNCTION DIAGNOSIS >

## ELECTRIC IGNITION SYSTEM

## System Diagram

Crankshaft position sensor (POS) Camshaft position sensor (PHASE)	Engine speed & Piston position		
Mass air flow sensor	Amount of intake air		· · · · ·
Engine coolant temperature sensor	Engine coolant temperature		
Throttle position sensor	Throttle position		
Accelerator pedal position sensor	Accelerator pedal position	ECM	Ignition timing control Ignition coil (with power transistor)
Park/neutral position (PNP) switch	Gear position		
Battery	Battery voltage		
Knock sensor	Engine knocking condition		
ABS actuator and electric unit (control unit)	Vehicle speed		
*: ECM determines the start signal status i		attery volt	age.

System Description

INFOID:000000004899801

JMBIA1321GB

### INPUT/OUTPUT SIGNAL CHART

Sensor	Input Signal to ECM	ECM function	Actuator
Crankshaft position sensor (POS)	Engine speed* <sup>2</sup> Piston position	Ignition timing	Ignition coil (with power transis- tor)
Camshaft position sensor (PHASE)			
Mass air flow sensor	Amount of intake air		
Engine coolant temperature sensor	Engine coolant temperature		
Throttle position sensor	Throttle position		
Accelerator pedal position sensor	Accelerator pedal position	control	
Park/neutral position (PNP) switch	Gear position		
Battery	Battery voltage*2		
Knock sensor	Engine knocking condition		
ABS actuator and electric unit (control unit)	Vehicle speed*1	- -	

\*1: This signal is sent to the ECM through CAN communication line.

\*2: ECM determines the start signal status by the signals of engine speed and battery voltage.

#### SYSTEM DESCRIPTION

Firing order: 1 - 3 - 4 - 2

The ignition timing is controlled by the ECM to maintain the best air-fuel ratio for every running condition of the engine. The ignition timing data is stored in the ECM.

The ECM receives information such as the injection pulse width and camshaft position sensor (PHASE) signal. Computing this information, ignition signals are transmitted to the power transistor.

During the following conditions, the ignition timing is revised by the ECM according to the other data stored in the ECM.

At starting

- During warm-up
- At idle
- At low battery voltage

During acceleration

The knock sensor retard system is designed only for emergencies. The basic ignition timing is programmed within the anti-knocking zone, if recommended fuel is used under dry conditions. The retard system does not

#### 021-62999292

021-62999292

[MR20DE]

INFOID:000000004899800

## **ELECTRIC IGNITION SYSTEM**

## www.digitalkhodro.com

#### [MR20DE]

operate under normal driving conditions. If engine knocking occurs, the knock sensor monitors the condition. The signal is transmitted to the ECM. The ECM retards the ignition timing to eliminate the knocking condition. А

#### **Component Parts Location**

< FUNCTION DIAGNOSIS >



021-62999292

1.

ECM

IPDM E/R

2.

JMBIA0340Z2

Fuel pump fuse (15A)

3.

Р

## **ELECTRIC IGNITION SYSTEM**

## www.digitalkhodro.com

#### [MR20DE]





1. Electric throttle control actuator 2. Throttle valve (with built-in position sensor, throttle control motor)



1. EVAP canister purge volume control 2. solenoid valve

Mass air flow sensor (with intake air temperature sensor)



1. Camshaft position sensor (PHASE) 2. Engine coolant temperature sensor



1. PCV valve

2. Ignition coil (with power transistor) 3. Fuel injector and spark plug

021-62999292



No. of sensor Location of a sensor in relation the engine air flow, starting from the fresh air intake through to the vehicle tailpipe in order numbering 1, 2, 3, and so on

#### 021-62999292

**EC-35** 

021-62999292

JMBIA1403GB

## **ELECTRIC IGNITION SYSTEM**

## www.digitalkhodro.com

#### < FUNCTION DIAGNOSIS >

[MR20DE]



- 1. Heated oxygen sensor 1 harness connector
- 2. Heated oxygen sensor 1
- 3. Heated oxygen sensor 2

4. Heated oxygen sensor 2 harness connector



- ASCD steering switch
   SET/COAST switch
- 2. CANSEL switch 5. MAIN switch
- 3. RESUME/ACCCELERATE switch



1. Stop lamp switch

2. ASCD brake switch

3. Accelerator pedal position sensor



- 1. ASCD clutch switch
- 2. Data link connector
# ELECTRIC IGNITION SYSTEM

#### < FUNCTION DIAGNOSIS >

[MR20DE]

А

EC

С

D

Ε

٣

K

L

М

Ν

0

р



- 1. Fuel level sensor unit and fuel pump 2. Fuel pressure regulator harness connector
- : Vehicle front

# **Component Description**

3. Fuel level sensor unit and fuel pump

ቁ

INFOID:000000004899803

JMBIA1328Z

Component	Reference	
Accelerator pedal position sensor	EC-221. "Description"	
Camshaft position sensor (PHASE)	EC-151, "Description"	
Crankshaft position sensor (POS)	EC-147. "Description"	
Engine coolant temperature sensor	EC-99, "Description"	
Ignition coil (with power transistor)	EC-249, "Description"	
Knock sensor	EC-145, "Description"	
Mass air flow sensor	EC-92. "Description"	
Park/neutral position (PNP) switch	EC-215, "Description"	
Throttle position sensor	EC-102. "Description"	

#### 021-62999292

# AIR CONDITIONING CUT CONTROL

#### www.digitalkhodro.com

[MR20DE]

INFOID-000000004899804

< FUNCTION DIAGNOSIS >

**AIR CONDITIONING CUT CONTROL** 

#### System Diagram



# System Description

INFOID:000000004899805

# INPUT/OUTPUT SIGNAL CHART

Sensor	Input Signal to ECM	ECM function	Actuator
Crankshaft position sensor (POS)	Engine speed*2		
Camshaft position sensor (PHASE)	Piston position         Engine coolant temperature         Accelerator pedal position         Battery voltage*2         Refrigerant pressure         Power steering operation*1         Vehicle speed*1		
Engine coolant temperature sensor			IPDM E/R ↓ Air conditioner relay ↓
Accelerator pedal position sensor			
Battery		Air conditioner	
Refrigerant pressure sensor		cut control	
EPS control unit			Compressor
ABS actuator and electric unit (control unit)			
BCM	Air conditioner operation*1		

\*1: This signal is sent to the ECM through CAN communication line.

\*2: ECM determines the start signal status by the signals of engine speed and battery voltage.

#### SYSTEM DESCRIPTION

This system improves engine operation when the air conditioner is used. Under the following conditions, the air conditioner is turned off.

- When the accelerator pedal is fully depressed.
- When cranking the engine.
- At high engine speeds.
- When the engine coolant temperature becomes excessively high.
- When operating power steering during low engine speed or low vehicle speed.
- When engine speed is excessively low.

#### 021-62999292



# **AIR CONDITIONING CUT CONTROL**

www.digitalkhodro.com

[MR20DE]

< FUNCTION DIAGNOSIS > · When refrigerant pressure is excessively low or high.

Component Parts Location

А INFOID:000000004899806



ECM 1.

Fuel pump fuse (15A) 3.

# 021-62999292



#### 021-62999292

. 1

IPDM E/R 2.

# **AIR CONDITIONING CUT CONTROL**

# www.digitalkhodro.com

#### < FUNCTION DIAGNOSIS >

[MR20DE]



1. Electric throttle control actuator 2. Throttle valve (with built-in position sensor, throttle control motor)



1. EVAP canister purge volume control 2. solenoid valve

Mass air flow sensor (with intake air temperature sensor)



1. Camshaft position sensor (PHASE) 2. Engine coolant temperature sensor



1. PCV valve

2. Ignition coil (with power transistor) 3. Fuel injector and spark plug

#### 021-62999292

#### **EC-40**

# **AIR CONDITIONING CUT CONTROL**

# www.digitalkhodro.com





# **AIR CONDITIONING CUT CONTROL**

## www.digitalkhodro.com

#### < FUNCTION DIAGNOSIS >

[MR20DE]



З.

- Heated oxygen sensor 1 harness 2. Heated oxygen sensor 1 connector
- 4. Heated oxygen sensor 2 harness connector



- ASCD steering switch 1. SET/COAST switch 4.
- CANSEL switch 2. 5. MAIN switch
- 3. **RESUME/ACCCELERATE switch**

Heated oxygen sensor 2



1. Stop lamp switch 2. ASCD brake switch З. Accelerator pedal position sensor



1. ASCD clutch switch 2. Data link connector

# AIR CONDITIONING CUT CONTROL

#### < FUNCTION DIAGNOSIS >

www.digitalkhodro.com

[MR20DE]

А

EC

С

D

Ε

۴

К

YARANA ...

М

Ν

0

p



- 1. Fuel level sensor unit and fuel pump 2. Fuel pressure regulator harness connector
- : Vehicle front

# **Component Description**

3. Fuel level sensor unit and fuel pump

INFOID:000000004899807

Component	Reference	
Accelerator pedal position sensor	EC-221, "Description"	
Camshaft position sensor (PHASE)	EC-151. "Description"	
Crankshaft position sensor (POS)	EC-147, "Description"	1
Engine coolant temperature sensor	EC-99. "Description"	
Refrigerant pressure sensor	EC-256, "Description"	

شرکت دیجیتال خودرو سامانه (مسئولیت محدود)

اولین سامانه دیجیتال تعمیر کاران خودرو در ایران

System Diagram

#### www.digitalkhodro.com AUTOMATIC SPEED CONTROL DEVICE (ASCD)

ASCD vehicle speed control

ECM

#### < FUNCTION DIAGNOSIS >

ASCD steering switch

ASCD brake switch

Stop lamp switch

ASCD clutch switch (M/T models)

Park/neutral position (PNP) switch

ABS actuator and electric unit (control unit)

TCM (CVT models)

# AUTOMATIC SPEED CONTROL DEVICE (ASCD)

ASCD steering switch operation

Brake pedal operation

Brake pedal operation

Clutch pedal operation

Gear position

Vehicle speed

Powertrain revolution

**INPUT/OUTPUT SIGNAL CHART** 

System Description

Sensor	Input signal to ECM	ECM function	Actuator	
ASCD steering switch	ASCD steering switch operation			
ASCD brake switch	نت دیجیتال خودر	-0 شر	Electric throttle control actuator	
Stop lamp switch	Brake pedal operation	ASCD vehicle speed control		
ASCD clutch switch (M/T models)	Clutch pedal operation			
Park/neutral position (PNP) switch	Gear position			
ABS actuator and electric unit (control unit)	Vehicle speed*			
TCM (M/T models)	Powertrain revolution*			

\*: This signal is sent to the ECM via the CAN communication line.

#### BASIC ASCD SYSTEM

Refer to Owner's Manual for ASCD operating instructions.

Automatic Speed Control Device (ASCD) allows a driver to keep vehicle at predetermined constant speed without depressing accelerator pedal. Driver can set vehicle speed in advance between approximately 40 km/ h (25 MPH) and 190 km/h (118 MPH) (For the Middle East), 40 km/h (25 MPH) and 160 km/h (100 MPH) (Except for the Middle East).

ECM controls throttle angle of electric throttle control actuator to regulate engine speed.

Operation status of ASCD is indicated by CRUISE lamp and SET lamp in combination meter. If any malfunction occurs in the ASCD system, it automatically deactivates control. NOTE:

Always drive vehicle in a safe manner according to traffic conditions and obey all traffic laws.

#### SET OPERATION

Press MAIN switch. (The CRUISE lamp in combination meter illuminates.)

When vehicle speed reaches a desired speed between approximately 40 km/h (25 MPH) and 190 km/h (118 MPH) (For the Middle East) or 40 km/h (25 MPH) and 160 km/h (100 MPH) (Except for the Middle East), press SET/COAST switch. (Then SET lamp in combination meter illuminates.)

#### ACCELERATE OPERATION

If the RESUME/ACCELERATE switch is pressed during cruise control driving, increase the vehicle speed until the switch is released or vehicle speed reaches maximum speed controlled by the system. And then ASCD will maintain the new set speed.

#### 021-62999292

#### 021-62999292

[MR20DE]

INFOID.00000004899806

Electric throttle control actuator

INFOID-00000000489980

JMBIA1822G

AUTOMATIC SPEED CONTROL DEVICE (ASCD) < FUNCTION DIAGNOSIS > [MR20DE]	
CANCEL OPERATION	•
When any of following conditions exist, cruise operation will be canceled.  • CANCEL switch is pressed	
<ul> <li>More than 2 switches at ASCD steering switch are pressed at the same time (Set speed will be cleared)</li> <li>Brake pedal is depressed</li> </ul>	
<ul> <li>Clutch pedal is depressed or gear position is changed to neutral position (M/T models)</li> <li>Selector lever position is changed to N, P, R</li> </ul>	ĺ
<ul> <li>Vehicle speed decreased to 13 km/h (8 MPH) lower than the set speed</li> <li>TCS system is operated</li> </ul>	
When the ECM detects any of the following conditions, the ECM will cancel the cruise operation and inform	)
<ul> <li>the driver by blinking indicator lamp.</li> <li>Engine coolant temperature is slightly higher than the normal operating temperature, CRUISE lamp may blink slowly.</li> </ul>	
When the engine coolant temperature decreases to the normal operating temperature, CRUISE lamp will stop blinking and the cruise operation will be able to work by pressing SET/COAST switch or RESUME/ ACCELERATE switch.	1
<ul> <li>Malfunction for some self-diagnoses regarding ASCD control: SET lamp will blink quickly.</li> <li>If MAIN switch is turned to OFF while ASCD is activated, all of ASCD operations will be canceled and vehicle speed memory will be erased.</li> </ul>	}
COAST OPERATION When the SET/COAST switch is pressed during cruise control driving, decrease vehicle set speed until the switch is released. And then ASCD will maintain the new set speed.	;
RESUME OPERATION When the RESUME/ACCELERATE switch is pressed after cancel operation other than pressing MAIN switch is performed, vehicle speed will return to last set speed. To resume vehicle set speed, vehicle condition must meet following conditions.	ı t
Brake pedal is released     Clutch pedal is released (M/T models)	
<ul> <li>Selector lever position is other than P and N (CVT models)</li> <li>Vehicle speed is between 40 km/h (25 MPH) and 190 km/h (118 MPH) (For the Middle East) or 40 km/h (25 MPH) and 160 km/h (100 MPH) (Except for the Middle East)</li> </ul>	5
اولین سامانه دیجیتال تعمیر کاران خودرو در ایرا	

.

Ρ

# **AUTOMATIC SPEED CONTROL DEVICE (ASCD)**

#### < FUNCTION DIAGNOSIS >

# **Component Parts Location**

[MR20DE]

INFOID:0000000489



4. Fuel injector

solenoid valve

7. Camshaft position sensor (PHASE)

13. EVAP canister purge volume control

10. ECM

- 5. Knock sensor
- 8. Engine coolant temperature sensor
- 11. Mass air flow sensor (with intake air 12. Electric throttle control actuator temperature sensor)
- 6. Cooling fan motor
- 9. IPDM E/R
  - (with built in throttle position sensor and throttle control motor)



1. ECM 2. IPDM E/R

Fuel pump fuse (15A) З.

#### 021-62999292

www.digitalkhodro.com

# www.digitalkhodro.com AUTOMATIC SPEED CONTROL DEVICE (ASCD) www.digitalkhodro.com

#### < FUNCTION DIAGNOSIS >

#### [MR20DE]

Ε

F

G

Н

J

Κ

L

Μ



Electric throttle control actuator 2. Throttle valve 1. (with built-in position sensor, throttle control motor)



EVAP canister purge volume control 2. solenoid valve

1.

Mass air flow sensor (with intake air temperature sensor)



Camshaft position sensor (PHASE) 2. Engine coolant temperature sensor 1.



1. PCV valve 2. Ignition coil (with power transistor) 3. Fuel injector and spark plug

021-62999292

**EC-47** 



- 1. Refrigerant pressure sensor 2.
  - 2. Resister

3. Cooling fan motor

IMBIA0345ZZ



- 1. Intake valve timing control solenoid 2. Knock sensor valve
- <a>
   Vehicle front



- 1. Crankshaft position sensor (POS) 2. Ground
- Carl : Vehicle front





# **AUTOMATIC SPEED CONTROL DEVICE (ASCD)**

#### < FUNCTION DIAGNOSIS >

www.digitalkhodro.com

[MR20DE]



# www.digitalkhodro.com AUTOMATIC SPEED CONTROL DEVICE (ASCD) www.digitalkhodro.com

#### < FUNCTION DIAGNOSIS >

# [MR20DE]



- 1. Fuel level sensor unit and fuel pump 2. Fuel pressure regulator hamess connector
- : Vehicle front

# Component Description

IMRIA13287

З. Fuel level sensor unit and fuel pump

INFOID:00000004899811

Component	Reference	
ASCD steering switch	EC-204, "Description"	
ASCD brake switch	EC-207. "Description"	
ASCD indicator	EC-239. "Description"	
Stop lamp switch	EC-218, "Description"	
Electric throttle control actuator	EC-167. "Description"	

021-62999292

## CAN COMMUNICATION

www.digitalkhodro.com

[MR20DE]

INFOID-00000004899812

А

D

E

F

G

Н

J

K

Ľ

M

N

0

Ρ

# < FUNCTION DIAGNOSIS >

#### **CAN COMMUNICATION**

#### System Description

CAN (Controller Area Network) is a serial communication line for real time application. It is an on-vehicle multiplex communication line with high data communication speed and excellent error detection ability. Many electronic control units are equipped onto a vehicle, and each control unit shares information and links with other control units during operation (not independent). In CAN communication, control units are connected with 2 communication lines (CAN H line, CAN L line) allowing a high rate of information transmission with less wiring. Each control unit transmits/receives data but selectively reads required data only. Refer to LAN-21, "CAN Communication Signal Chart", about CAN communication for detail.

. ·

I

# COOLING FAN CONTROL

## www.digitalkhodro.com

< FUNCTION DIAGNOSIS >

# **COOLING FAN CONTROL**

[MR20DE]

INFOID:000000004899813

#### System Diagram



## System Description

INFOID:000000004899814

#### INPUT/OUTPUT SIGNAL CHART

Sensor	Input signal to ECM	ECM function	Actuator	
Crankshaft position sensor (POS)	Engine speed*1			
Camshaft position sensor (PHASE)	Piston position			
Engine coolant temperature sensor	Engine coolant temperature		IPDM E/R	
Refrigerant pressure sensor	Refrigerant pressure	Cooling fan control	↓ Cooling fan relay ↓	
Battery	Battery voltage*1			
ABS actuator and electric unit (control unit)	Vehicle speed*2		Cooling fan motor	
BCM	Air conditioner operation*2	1	· ·	

\*1: The ECM determines the start signal status by the signals of engine speed and battery voltage.

\*2: This signal is sent to ECM through CAN communication line.

#### SYSTEM DESCRIPTION

ECM controls cooling fan speed corresponding to vehicle speed, engine coolant temperature, refrigerant pressure, air conditioner ON signal. Then control system has 3-step control [HIGH/LOW/OFF].

# **COOLING FAN CONTROL**

# www.digitalkhodro.com

#### [MR20DE]

#### < FUNCTION DIAGNOSIS >



#### Cooling Fan Relay Operation

The ECM controls cooling fan relays through CAN communication line.

	Cooling fan relay		
Cooling fan speed	1	3	
Stop (OFF)	اولین سOFF د بحیثال	OFF .	
Low (LOW)	ON	OFF	
High (HI)	OFF	ON	

021-62999292

L

Μ

Ν

0

Ρ

# **COOLING FAN CONTROL**

www.digitalkhodro.com

[MR20DE]

#### < FUNCTION DIAGNOSIS >

#### **Component Parts Location**

#### INFOID:000000004899815



- Ignition coil (with power transistor) 1. and spark plug
- 4. **Fuel injector**
- 7. Camshaft position sensor (PHASE)
- 10. ECM

- 5. Knock sensor
- 8. Engine coolant temperature sensor
- Mass air flow sensor (with intake air 12. Electric throttle control actuator 11. temperature sensor)
- Refrigerant pressure sensor
- 6. Cooling fan motor
- IPDM E/R 9.
  - (with built in throttle position sensor and throttle control motor)

13. EVAP canister purge volume control solenoid valve



ECM 1.

2. IPDM E/R З. Fuel pump fuse (15A)



# **COOLING FAN CONTROL**

## www.digitalkhodro.com

[MR20DE]



021-62999292

# **COOLING FAN CONTROL**

## www.digitalkhodro.com

#### < FUNCTION DIAGNOSIS >

[MR20DE]



1. Refrigerant pressure sensor 2. Resister

3. Cooling fan motor



- 1. Intake valve timing control solenoid 2. Knock sensor valve
- : Vehicle front



- 1. Crankshaft position sensor (POS) 2. Ground
- : Vehicle front



# **COOLING FAN CONTROL**

## www.digitalkhodro.com

#### < FUNCTION DIAGNOSIS >

[MR20DE]



# **COOLING FAN CONTROL**

# www.digitalkhodro.com

#### [MR20DE]





- 1. Fuel level sensor unit and fuel pump 2. Fuel pressure regulator harness connector
- $\triangleleft$ : Vehicle front

# **Component Description**

3 JABIA 13282ZZ

3. Fuel level sensor unit and fuel pump

INFOID:000000004899816

Component	Reference	
Camshaft position sensor (PHASE)	EC-151, "Description"	
Crankshaft position sensor (POS)	EC-147. "Description"	
Cooling fan motor	EC-240, "Description"	
Engine coolant temperature sensor	EC-99. "Description"	
Refrigerant pressure sensor	EC-256, "Description"	

# . شرکت دیجیتال خودرو سامانه (مسئولیت محدود)

# اولین سامانه دیجیتال تعمیرکاران خودرو در ایران

.

021-62999292

EC-58

# **EVAPORATIVE EMISSION SYSTEM**

#### < FUNCTION DIAGNOSIS >

# EVAPORATIVE EMISSION SYSTEM

#### System Diagram



## System Description

#### INPUT/OUTPUT SIGNAL CHART

Sensor	Input signal to ECM	ECM function	Actuator
Crankshaft position sensor (POS)	Engine speed*1		
Camshaft position sensor (PHASE)	Piston position		
Mass air flow sensor	Amount of intake air		
Engine coolant temperature sensor	Engine coolant temperature		
Heated oxygen sensor 1	Density of oxygen in exhaust gas (Mixture ratio feedback signal)	EVAP canister purge flow control	EVAP canister purge vol- ume control solenoid valve
Throttle position sensor	Throttle position		
Accelerator pedal position sensor	Accelerator pedal position		
Battery	Battery voltage*1	1	
ABS actuator and electric unit (control unit)	Vehicle speed*2	1	

\*2: This signal is sent to the ECM through CAN communication line.

INFOID:000000004899817

INFOID:000000004899818

www.digitalkhodro.com

[MR20DE]

А

EC

С

D

Ε

F

G

Н

Ν

0

Р

# EVAPORATIVE EMISSION SYSTEM

#### www.digitalkhodro.com

#### [MR20DE]



The evaporative emission system is used to reduce hydrocarbons emitted into the atmosphere from the fuel system. This reduction of hydrocarbons is accomplished by activated charcoals in the EVAP canister. The fuel yappr in the sealed fuel tank is led into the EVAP canister which contains activated costoon and the

The fuel vapor in the sealed fuel tank is led into the EVAP canister which contains activated carbon and the vapor is stored there when the engine is not operating or when refueling to the fuel tank.

The vapor in the EVAP canister is purged by the air through the purge line to the intake manifold when the engine is operating. EVAP canister purge volume control solenoid valve is controlled by ECM. When the engine operates, the flow rate of vapor controlled by EVAP canister purge volume control solenoid valve is proportionally regulated as the air flow increases.

EVAP canister purge volume control solenoid valve also shuts off the vapor purge line during decelerating and idling.

EVAPORATIVE EMISSION LINE DRAWING

اولين سامانه ديجيتال تعميركاران خودرو در ايران

# EVAPORATIVE EMISSION SYSTEM

# www.digitalkhodro.com

#### < FUNCTION DIAGNOSIS >



# **EVAPORATIVE EMISSION SYSTEM**

# www.digitalkhodro.com

#### < FUNCTION DIAGNOSIS >

#### **Component Parts Location**

#### [MR20DE]

INFOID:000000004898



13. EVAP canister purge volume control solenoid valve

(with built in throttle position sensor



ECM . 1.

2. IPDM E/R

3. Fuel pump fuse (15A)

1.

1.

# **EVAPORATIVE EMISSION SYSTEM**

## www.digitalkhodro.com

[MR20DE]

F

G

Н

I

J

Κ

L

М

021-62999292







- EVAP canister purge volume control 2. solenoid valve
- Mass air flow sensor (with intake air temperature sensor)



1. Camshaft position sensor (PHASE) 2. Engine coolant temperature sensor



Fuel injector

1. PCV valve

 Ignition coil (with power transistor) 3. and spark plug

# **EVAPORATIVE EMISSION SYSTEM**

www.digitalkhodro.com

#### < FUNCTION DIAGNOSIS >





- 1. Intake valve timing control solenoid 2. Knock sensor valve
- Carl : Vehicle front



- 1. Crankshaft position sensor (POS) 2. Ground
- : Vehicle front





# **EVAPORATIVE EMISSION SYSTEM**

## www.digitalkhodro.com

#### < FUNCTION DIAGNOSIS >





# **EVAPORATIVE EMISSION SYSTEM**

## < FUNCTION DIAGNOSIS >



- 1. Fuel level sensor unit and fuel pump 2. Fuel pressure regulator harness connector
- : Vehicle front

# **Component** Description

INFOID:000000004899820

Fuel level sensor unit and fuel pump

MBIA1328Z

a

З.

Component	Reference		
Accelerator pedal position sensor	EC-221, "Description"		
Camshaft position sensor (PHASE)	EC-151, "Description"		
Crankshaft position sensor (POS)	EC-147. "Description"		
Engine coolant temperature sensor	EC-99. "Description"		
EVAP canister purge volume control solenoid valve	EC-159, "Description"		
Heated oxygen sensor 1	EC-105, "Description"		
Mass air flow sensor	EC-92, "Description"		
Throttle position sensor	EC-102, "Description"		

# ولين سامانه ديجيتال تعمير كارّان خودرو در ايران

# www.digitalkhodro.com



# INTAKE VALVE TIMING CONTROL

#### < FUNCTION DIAGNOSIS >

INTAKE VALVE TIMING CONTROL





## System Description

INFOID:000000004899822

G

J

#### **INPUT/OUTPUT SIGNAL CHART**

Sensor Input signal to ECM		ECM function	Actuator	
Crankshaft position sensor (POS)	Engine speed			
Camshaft position sensor (PHASE)	Piston position	Intake valve	Intake valve timing control	
Engine coolant temperature sensor	Engine coolant temperature	timing control	solenoid valve	
ABS actuator and electric unit (control unit)	Vehicle speed*			

\*: This signal is sent to the ECM through CAN communication line

#### SYSTEM DESCRIPTION



Ρ This mechanism hydraulically controls cam phases continuously with the fixed operating angle of the intake valve.

The ECM receives signals such as crankshaft position, camshaft position, engine speed, and engine coolant temperature. Then, the ECM sends ON/OFF pulse duty signals to the intake valve timing (IVT) control solenoid valve depending on driving status. This makes it possible to control the shut/open timing of the intake valve to increase engine torgue in low/mid speed range and output in high-speed range.

[MR20DE]

A

# INTAKE VALVE TIMING CONTROL

< FUNCTION DIAGNOSIS >

#### **Component Parts Location**

www.digitalkhodro.com

INFOID:000000004899823



1. ECM

2. IPDM E/R

3. Fuel pump fuse (15A)

# 021-62999292



# INTAKE VALVE TIMING CONTROL

## www.digitalkhodro.com

[MR20DE]

F

G

Н

l

J

Κ

L

Μ







- EVAP canister purge volume control 2 solenoid valve
- Mass air flow sensor (with intake air temperature sensor)



1. Camshaft position sensor (PHASE) 2. Engine coolant temperature sensor



1. PCV valve

 Ignition coil (with power transistor) 3. Fue and spark plug

Fuel injector

# INTAKE VALVE TIMING CONTROL

## www.digitalkhodro.com

#### < FUNCTION DIAGNOSIS >

[MR20DE]



- 1. Refrigerant pressure sensor
- 2. Resister

Cooling fan motor

З.



- 1. Intake valve timing control solenoid 2. Knock sensor valve
- <a> : Vehicle front</a>



- 1. Crankshaft position sensor (POS) 2. Ground
- : Vehicle front





# INTAKE VALVE TIMING CONTROL

www.digitalkhodro.com

#### < FUNCTION DIAGNOSIS >

[MR20DE]



#### 021-62999292

# INTAKE VALVE TIMING CONTROL

# www.digitalkhodro.com

#### .

#### < FUNCTION DIAGNOSIS >





- 1. Fuel level sensor unit and fuel pump 2. Fuel pressure regulator harness connector
- : Vehicle front

## Component Description

3. Fuel level sensor unit and fuel pump

INFOID:000000004899824

Component	Reference
Camshaft position sensor (PHASE)	EC-151. "Description"
Crankshaft position sensor (POS)	EC-147. "Description"
Engine coolant temperature sensor	EC-99. "Description"
Intake valve timing control solenoid valve	EC-164. "Description"

# شرکت دیجیتال خودرو سامانه (مسئولیت محدود)

# اولین سامانه دیجیتال تعمیر کاران خودر و در ایران

. . .

021-62999292
# < FUNCTION DIAGNOSIS >

# ON BOARD DIAGNOSTIC (OBD) SYSTEM

# **Diagnosis Description**

# INTRODUCTION

The ECM has an on board diagnostic system, which detects malfunctions related to engine sensors or actuators. The ECM also records various emission-related diagnostic information including:

Diagnostic service	÷	
	•	
Service \$03 of ISO 15031-5		
Service \$02 of ISO 15031-5		D
Service \$01 of ISO 15031-5	t	
Service \$07 of ISO 15031-5		5
Service \$06 of ISO 15031-5		<b>E</b>
Service \$09 of ISO 15031-5	•	
	Service \$02 of ISO 15031-5           Service \$01 of ISO 15031-5           Service \$07 of ISO 15031-5           Service \$06 of ISO 15031-5	Service \$02 of ISO 15031-5         .           Service \$01 of ISO 15031-5         .           Service \$07 of ISO 15031-5         .           Service \$06 of ISO 15031-5         .

The above information can be checked using procedures listed in the table below.

x: Applicable -: Not applicable

ve Applicable

	DTC	1st trip DTC	Freeze Frame data	SRT code	Test value	G
GST	×	×	×	×	×	
ECM	×	×*				ப

\*: When DTC and 1st trip DTC simultaneously appear on the display, they cannot be clearly distinguished from each other. The malfunction indicator (MIL) on the instrument panel lights up when the same malfunction is detected in two consecutive trips (Two trip detection logic), or when the ECM enters fail-safe mode. (Refer to EC-269, "Fail Safe".)

#### TWO TRIP DETECTION LOGIC

When a malfunction is detected for the first time, 1st trip DTC is stored in the ECM memory. The MIL will not light up at this stage. <1st trip>

If the same malfunction is detected again during the next drive, the DTC and Freeze Frame data are stored in the ECM memory, and the MIL lights up. The MIL lights up at the same time when the DTC is stored. <2nd trip> The "trip" in the "Two Trip Detection Logic" means a driving mode in which self-diagnosis is performed during vehicle operation. Specific on board diagnostic items will cause the ECM to light up or blink the MIL, and store DTC and Freeze Frame data, even in the 1st trip, as shown below.

		М	IL		D.	TC	1st trip	DTC	
Items	1st trip 2nd trip		1.04.0	- Ond trip	1 ot trip	2nd trip			
nems	Błinking	Lighting up	Blinking	Lighting up	1st trip displaying	2nd trip displaying	1st trip displaying	display- ing	١
Misfire (Possible three way catalyst damage) — DTC: P0300 - P0304 is being detected	×	 -	_		_	_	×	!	ł
Misfire (Possible three way catalyst damage) — DTC: P0300 - P0304 is being detected	_		×	_		×	·. 	_	(
One trip detection diagnoses (Re- fer to EC-272. "DTC_Index".)	-	×	_	_	×		_	—;	1
Except above		_	-	×		×	×	_	I

#### DTC AND FREEZE FRAME DATA

#### DTC and 1st Trip DTC

The 1st trip DTC (whose number is the same as the DTC number) is displayed for the latest self-diagnostic result obtained. If the ECM memory was cleared previously, and the 1st trip DTC did not reoccur, the 1st trip DTC will not be displayed.

# 021-62999292

# www.digitalkhodro.com

[MR20DE]

INFO/D:0000000489982

A

EC

F

J

K

Not applicable

# < FUNCTION DIAGNOSIS >

# www.digitalkhodro.com

# [MR20DE]

If a malfunction is detected during the 1st trip, the 1st trip DTC is stored in the ECM memory. The MIL will not light up (two trip detection logic). If the same malfunction is not detected in the 2nd trip (meeting the required driving pattern), the 1st trip DTC is cleared from the ECM memory. If the same malfunction is detected in the 2nd trip, both the 1st trip DTC and DTC are stored in the ECM memory and the MIL lights up. In other words, the DTC is stored in the ECM memory and the MIL lights up. In other words, the DTC is stored in the ECM memory and the MIL lights up when the same malfunction occurs in two consecutive trips. If a 1st trip DTC is stored and a non-diagnostic operation is performed between the 1st and 2nd trips, only the 1st trip DTC will continue to be stored. For malfunctions that blink or light up the MIL during the 1st trip, the DTC and 1st trip DTC are stored in the ECM memory.

Procedures for clearing the DTC and the 1st trip DTC from the ECM memory are described in "HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION".

For malfunctions in which 1st trip DTCs are displayed, refer to "EMISSION-RELATED DIAGNOSTIC INFOR-MATION ITEMS". These items are required by legal regulations to continuously monitor the system/component.

1st trip DTC is specified in Service \$07 of ISO 15031-5. 1st trip DTC detection occurs without lighting up the MIL and therefore does not warn the driver of a malfunction. However, 1st trip DTC detection will not prevent the vehicle from being tested, for example during inspection/Maintenance (I/M) tests.

When a 1st trip DTC is detected, check, print out or write down and erase (1st trip) DTC and Freeze Frame data as specified in Work Flow procedure Step 2, refer to <u>EC-6</u>, <u>"Work Flow"</u>. Then perform DTC CONFIRMA-TION PROCEDURE or Component Function Check to try to duplicate the malfunction. If the malfunction is duplicated, the item requires repair.

#### Freeze Frame Data

The ECM records the driving conditions such as fuel system status, calculated load value, engine coolant temperature, short term fuel trim, long term fuel trim, engine speed, vehicle speed, absolute throttle position, base fuel schedule and intake air temperature at the moment a malfunction is detected.

Data which are stored in the ECM memory, along with the 1st trip DTC. The data, stored together with the DTC data, are called freeze frame data and displayed on GST.

Only one set of freeze frame data can be stored in the ECM. It is updated each time a different 1st trip DTC is detected. However, once freeze frame data (2nd trip detection/MIL on) is stored in the ECM memory. Remember, only one set of freeze frame data can be stored in the ECM. The ECM has the following priorities to update the data.

Priority		Items
ودراي	Freeze frame data	Misfire — DTC: P0300 - P0304 Fuel Injection System Function — DTC: P0171, P0172
2		Except the above items (Includes CVT related items)

For example, the EGR malfunction (Priority: 2) was detected and the freeze frame data was stored in the 2nd trip. After that when the misfire (Priority: 1) is detected in another trip, the freeze frame data will be updated from the EGR malfunction to the misfire. However, once freeze frame data is stored in the ECM memory. If freeze frame data is stored in the ECM memory and freeze frame data with the same priority occurs later, the first (original) freeze frame data remains unchanged in the ECM memory.

Both freeze frame data (along with the DTCs) is cleared when the ECM memory is erased. Procedures for clearing the ECM memory are described in "HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFOR-MATION".

How to Read DTC and 1st Trip DTC

#### With GST

GST (Generic Scan Tool) Examples: P0340, P1148, P1706, etc. These DTCs are prescribed by ISO 15031-6.

#### No Tools

The number of blinks of the MIL in the Diagnostic Test Mode II (Self-Diagnostic Results) indicates the DTC. Example: 0340, 1148, 1706, etc.

These DTCs are controlled by NISSAN.

- 1st trip DTC No. is the same as DTC No.
- Output of a DTC indicates a malfunction. However, GST or the Diagnostic Test Mode II do not indicate whether the malfunction is still occurring or has occurred in the past and has returned to normal.

How to Erase DTC and 1st Trip DTC With GST NOTE:

[MR20DE] < FUNCTION DIAGNOSIS > If the ignition switch stays ON after repair work, be sure to turn ignition switch OFF once. Wait at least 10 seconds and then turn it ON (engine stopped) again. A Select Service \$04 with GST (Generic Scan Tool). 🔊 No Tools NOTE: EC If the ignition switch stays ON after repair work, be sure to turn ignition switch OFF once. Wait at least 10 seconds and then turn it ON (engine stopped) again. Erase DTC in ECM. Refer to HOW TO ERASE DIAGNOSTIC TEST MODE II (SELF-DIAGNOSTIC С RESULTS). • If the battery is disconnected, the emission-related diagnostic information will be lost within 24 hours. The following data are cleared when the ECM memory is erased. D - Diagnostic trouble codes 1st trip diagnostic trouble codes - Freeze frame data Ε - System readiness test (SRT) codes - Test values Actual work procedures are explained using a DTC as an example. Be careful so that not only the DTC, but all of the data listed above, are cleared from the ECM memory during work procedures. F SYSTEM READINESS TEST (SRT) CODE System Readiness Test (SRT) code is specified in Service \$01 of ISO 15031-5. G As part of an enhanced emissions test for Inspection & Maintenance (I/M), certain states require the status of SRT be used to indicate whether the ECM has completed self-diagnosis of major emission systems and components. Completion must be verified in order for the emissions inspection to proceed. If a vehicle is rejected for a State emissions inspection due to one or more SRT items indicating "INCMP", use Н the information in this Service Manual to set the SRT to "CMPLT". In most cases the ECM will automatically complete its self-diagnosis cycle during normal usage, and the SRT status will indicate "CMPLT" for each application system. Once set as "CMPLT", the SRT status remains "CMPLT" until the self-diagnosis memory is erased. Occasionally, certain portions of the self-diagnostic test may not be completed as a result of the customer's normal driving pattern; the SRT will indicate "INCMP" for these items. NOTE: J The SRT will also indicate "INCMP" if the self-diagnosis memory is erased for any reason or if the ECM memory power supply is interrupted for several hours. If, during the state emissions inspection, the SRT indicates "CMPLT" for all test items, the inspector will con-K tinue with the emissions test. However, if the SRT indicates "INCMP" for one or more of the SRT items the vehicle is returned to the customer untested. NOTE: If MIL is ON during the state emissions inspection, the vehicle is also returned to the customer untested even L though the SRT indicates "CMPLT" for all test items. Therefore, it is important to check SRT ("CMPLT") and DTC (No DTCs) before the inspection. SRT Item M The table below shows required self-diagnostic items to set the SRT to "CMPLT".

SRT item	Performance Priority	Required self-diagnostic items to set the SRT to "CMPLT"	Corresponding DTC No.
CATALYST	2	Three way catalyst function	P0420
HO2S	1	Heated oxygen sensor 1	P1133
		Heated oxygen sensor 1	P1143
	Heated oxygen sensor 1	P1144	
		Heated oxygen sensor 2	P0139
		Heated oxygen sensor 2	P1146
		Heated oxygen sensor 2	P1147
HO2S HTR	1	Heated oxygen sensor 1 heater	P0135
		Heated oxygen sensor 2 heater	P0141

SRT Set Timing

# < FUNCTION DIAGNOSIS >

# www.digitalkhodro.com

## [MR20DE]

SRT is set as "CMPLT" after self-diagnosis has been performed one or more times. Completion of SRT is done regardless of whether the result is OK or NG. The set timing is different between OK and NG results and is shown in the table below.

				Example		
Self-diagnosis result		Diagnosis	$\leftarrow ON \rightarrow C$		ion cycle OFF $\leftarrow$ ON $\rightarrow$ OF	$F \leftarrow ON \rightarrow$
All OK	Case 1	P0400	OK (1)	- (1)	OK (2)	— (2)
		P0402	OK (1)	— (1)	— (1)	OK (2)
		P1402	OK (1)	OK (2)	— (2)	— (2)
		SRT of EGR	"CMPLT"	"CMPLT"	"CMPLT"	"CMPLT"
	Case 2	P0400	OK (1)	— (1)	- (1)	(1)
		P0402	— (0)	— (0)	OK (1)	— (1)
		P1402	OK (1)	OK (2)	(2)	(2)
		SRT of EGR	"INCMP"	"INCMP"	"CMPLT"	"CMPLT"
NG exists	Case 3	P0400	ОК	ОК	-	_
	P0402				_	
	P1 <b>402</b>	NG	_	NG	NG (Consecutiv NG)	
	(1st trip) DTC	1st trip DTC	-	1st trip DTC	DTC (= MIL ON)	
		SRT of EGR	"INCMP"	"INCMP"	"INCMP"	"CMPLT"

OK: Self-diagnosis is carried out and the result is OK.

NG: Self-diagnosis is carried out and the result is NG.

-: Self-diagnosis is not carried out.

When all SRT related self-diagnoses showed OK results in a single cycle (Ignition OFF-ON-OFF), the SRT will indicate "CMPLT".  $\rightarrow$  Case 1 above

When all SRT related self-diagnoses showed OK results through several different cycles, the SRT will indicate "CMPLT" at the time the respective self-diagnoses have at least one OK result.  $\rightarrow$  Case 2 above

If one or more SRT related self-diagnoses showed NG results in 2 consecutive cycles, the SRT will also indicate "CMPLT".  $\rightarrow$  Case 3 above

The table above shows that the minimum number of cycles for setting SRT as "INCMP" is one (1) for each self-diagnosis (Case 1 & 2) or two (2) for one of self-diagnoses (Case 3). However, in preparation for the state emissions inspection, it is unnecessary for each self-diagnosis to be executed twice (Case 3) for the following reasons:

• The SRT will indicate "CMPLT" at the time the respective self-diagnoses have one (1) OK result.

• The emissions inspection requires "CMPLT" of the SRT only with OK self-diagnosis results.

- When, during SRT driving pattern, 1st trip DTC (NG) is detected prior to "CMPLT" of SRT, the self-diagnosis memory must be erased from ECM after repair.
- If the 1st trip DTC is erased, all the SRT will indicate "INCMP".
   NOTE:

SRT can be set as "CMPLT" together with the DTC(s). Therefore, DTC check must always be carried out prior to the state emission inspection even though the SRT indicates "CMPLT".

SRT Service Procedure

www.digitalkhodro.com



2. When the engine is started, the MIL should go off. If the MIL remains on, the on board diagnostic system has detected an engine system malfunction.



# 021-62999292

www.digitalkhodro.com

< FUNCTION DIAGNOSIS >

[MR20DE]

On Board Diagnostic System Function The on board diagnostic system has the following four functions.

Diagnostic Test Mode	KEY and ENG. Status	Function	Explanation of Function
Mode I	Ignition switch in ON position	BULB CHECK	This function checks the MIL bulb for damage (blown, open circuit, etc.). If the MIL does not come on, check MIL circuit.
		MALFUNCTION WARNING	<ul> <li>This is a usual driving condition. When a malfunction is detected twice in two consecutive driving cycles (two trip detection logic), the MIL will light up to inform the driver that a malfunction has been detected.</li> <li>The following malfunctions will light up or blink the MIL in the 1st trip.</li> <li>Misfire (Possible three way catalyst damage)</li> <li>One trip detection diagnoses</li> </ul>
Mode II	Ignition switch in ON position	SELF-DIAGNOSTIC RESULTS	This function allows DTCs and 1st trip DTCs to be read.
	Engine stopped	🐽 🔹 🐽 دیجیتال خودرو س	شرکت
ودرو در ایر	Engine running	HEATED OXYGEN SENSOR 1 MONITOR	This function allows the fuel mixture condition (lean or rich), monitored by heated oxygen sensor 1, to be read.

Diagnostic Test Mode I — Bulb Check

In this mode, the MIL on the instrument panel should stay ON. If it remains OFF, check MIL circuit. Refer to EC-254, "Component Function Check".

Diagnostic Test Mode I — Malfunction Warning

MIL	• •	Condition	· · · · · · · · · · · · · · · · · · ·
ON	When the malfunction is detected.		
OFF	No malfunction.		£

This DTC number is clarified in Diagnostic Test Mode II (SELF-DIAGNOSTIC RESULTS)

Diagnostic Test Mode II — Self-diagnostic Results

In this mode, the DTC and 1st trip DTC are indicated by the number of blinks of the MIL as shown below. The DTC and 1st trip DTC are displayed at the same time. If the MIL does not illuminate in diagnostic test mode I (Malfunction warning), all displayed items are 1st trip DTCs. If only one code is displayed when the MIL illuminates in diagnostic test mode II (SELF-DIAGNOSTIC RESULTS), it is a DTC; if two or more codes are

# < FUNCTION DIAGNOSIS >

www.digitalkhodro.com

#### [MR20DE]

displayed, they may be either DTCs or 1st trip DTCs. DTC No. is same as that of 1st trip DTC. These unidentified codes can be identified by using the GST. A DTC will be used as an example for how to read a code.



A particular trouble code can be identified by the number of four-digit numeral flashes. The "zero" is indicated by the number of ten flashes. The length of time the 1,000th-digit numeral flashes on and off is 1.2 seconds consisting of an ON (0.6-second) - OFF (0.6-second) cycle.

The 100th-digit numeral and lower digit numerals consist of a 0.3-second ON and 0.3-second OFF cycle. A change from one digit numeral to another occurs at an interval of 1.0-second OFF. In other words, the later H

numeral appears on the display 1.3 seconds after the former numeral has disappeared.

A change from one trouble code to another occurs at an interval of 1.8-second OFF. In this way, all the detected malfunctions are classified by their DTC numbers. The DTC 0000 refers to no mal-

function. (See EC-272, "DTC Index".)

The DTC can be erased from the back up memory in the ECM by depressing accelerator pedal. Refer to "HOW TO ERASE DIAGNOSTIC TEST MODE II (SELF-DIAGNOSTIC RESULTS)".

- If the battery is disconnected, the DTC will be lost from the backup memory within 24 hours.
- Be careful not to erase the stored memory before starting trouble diagnoses.

Diagnostic Test Mode II — Heated Oxygen Sensor 1 Monitor

In this mode, the MIL displays the condition of the fuel mixture (lean or rich) which is monitored by the heated oxygen sensor 1.

MIL	Fuel mixture condition in the exhaust gas	Air fuel ratio feedback control condition	L
ON	Lean	Closed loop system	
OFF ·	Rich	Closed loop system	
*Remains ON or OFF	Any condition	Open loop system	M

\*: Maintains conditions just before switching to open loop.

To check the heated oxygen sensor 1 function, start engine in the Diagnostic Test Mode II and warm it up until engine coolant temperature indicator points to the middle of the gauge.

Next run engine at about 2,000 rpm for about 2 minutes under no load conditions. Then make sure that the MIL comes ON more than 5 times within 10 seconds with engine running at 2,000 rpm under no load. MIL FLASHING WITHOUT DTC

If the ECM is in Diagnostic Test Mode II, MIL may flash when engine is running. In this case, check ECM diagnostic test mode. How to switch the diagnostic test (function) modes, and details of the above functions are described later. Refer to "How to Switch Diagnostic Test Mode".

How to Switch Diagnostic Test Mode **NOTE:** 

- It is better to count the time accurately with a clock.
- It is impossible to switch the diagnostic mode when an accelerator pedal position sensor circuit has a malfunction.

Always ECM returns to Diagnostic Test Mode I after ignition switch is turned OFF.
 HOW TO SET DIAGNOSTIC TEST MODE II (SELF-DIAGNOSTIC RESULTS)

021-62999292

J

0

р

# www.digitalkhodro.com

# ON BOARD DIAGNOSTIC (OBD) SYSTEM

# < FUNCTION DIAGNOSIS >

- [MR20DE]
- 1. Confirm that accelerator pedal is fully released, turn ignition switch ON and wait 3 seconds.
- 2. Repeat the following procedure quickly five times within 5 seconds.
- a. Fully depress the accelerator pedal.
- b. Fully release the accelerator pedal.
- 3. Wait 7 seconds, fully depress the accelerator pedal and keep it for approx. 10 seconds until the MIL starts blinking.
- Fully release the accelerator pedal. ECM has entered to Diagnostic Test Mode II (Self-diagnostic results). NOTE:

#### Wait until the same DTC (or 1st trip DTC) appears to confirm all DTCs certainly.



HOW TO SET DIAGNOSTIC TEST MODE II (HEATED OXYGEN SENSOR 1 MONITOR)

- 1. Set the ECM in Diagnostic Test Mode II (Self-diagnostic results).
- 2. Start Engine.

ECM has entered to Diagnostic Test Mode II (Heated oxygen sensor 1 monitor).

- HOW TO ERASE DIAGNOSTIC TEST MODE II (SELF-DIAGNOSTIC RESULTS)
- 1. Set ECM in Diagnostic Test Mode II (Self-diagnostic results).
- 2. Fully depress the accelerator pedal and keep it for more than 10 seconds. The emission-related diagnostic information has been erased from the backup memory in the ECM.
- 3. Fully release the accelerator pedal, and confirm the DTC 0000 is displayed.

#### **OBD System Operation Chart**

Relationship Between MIL, 1st Trip DTC, DTC and Detectable Items

- When a malfunction is detected for the first time, the 1st trip DTC is stored in the ECM memory.
- When the same malfunction is detected in two consecutive trips, the DTC and the freeze frame data are stored in the ECM memory, and the MIL will come on.
- The MIL will go off after the vehicle is driven 3 times (pattern B) with no malfunction. The drive is counted only when the recorded driving pattern is met (as stored in the ECM). If another malfunction occurs while counting, the counter will reset.
- The DTC and the freeze frame data will be stored until the vehicle is driven 40 times (pattern A) without the same malfunction recurring (except for Misfire and Fuel Injection System). For Misfire and Fuel Injection System, the DTC and freeze frame data will be stored until the vehicle is driven 80 times (pattern C) without the same malfunction recurring.
- The 1st trip DTC is not displayed when the self-diagnosis results in OK for the 2nd trip.

Summary Chart

Items	Fuel Injection System	Misfire	Other
MIL (goes off)	3 (pattern B)	3 (pattern B)	3 (pattern B)
DTC, Freeze Frame Data (no display)	80 (pattern C)	80 (pattern C)	40 (pattern A)
1st Trip DTC (clear)	1 (pattern C), *1	1 (pattern C), *1	1 (pattern B)

For details about patterns B and C under "Fuel Injection System" and "Misfire", see "EXPLANATION FOR DRIVING PATTERNS FOR "MISFIRE <EXHAUST QUALITY DETERIORATION>", "FUEL INJECTION SYSTEM".

For details about patterns A and B under Other, see "EXPLANATION FOR DRIVING PATTERNS FOR "MISFIRE <EXHAUST QUALITY DETERIORATION>", "FUEL INJECTION SYSTEM".

\*1: Clear timing is at the moment OK is detected.

\*2: Clear timing is when the same malfunction is detected in the 2nd trip.

www.d	ligitalk	(hodro	.com
-------	----------	--------	------

ON BOARD DIAGNOSTIC (OBD) SYSTEM		
< FUNCTION DIAGNOSIS >	[MR20DE]	
Explanation for Driving Patterns for "Misfire <exhaust deterioration="" quality="">", "Fuel Injection System" <driving b="" pattern=""> Driving pattern B means the vehicle operation as follows:</driving></exhaust>	:	A
<ul> <li>All components and systems should be monitored at least once by the OBD system.</li> <li>The B counter will be cleared when the malfunction is detected once regardless of the driving p</li> <li>The B counter will be counted up when driving pattern B is satisfied without any malfunction.</li> <li>The MIL will go off when the B counter reaches 3. (*2 in "OBD SYSTEM OPERATION CHART")</li> </ul>	ľ	EO
<driving c="" pattern=""> Driving pattern C means the vehicle operation as follows: The following conditions should be satisfied at the same time: Engine speed: (Engine speed in the freeze frame data) ±375 rpm</driving>		С
Calculated load value: (Calculated load value in the freeze frame data) x (1±0.1) [%] Engine coolant temperature (T) condition: • When the freeze frame data shows lower than 70°C (158°F), T should be lower than 70°C (158	I°F)	D
<ul> <li>When the freeze frame data shows higher than or equal to 70°C (158°F), T should be higher that 70°C (158°F).</li> <li>Example:</li> </ul>	in or equal to	Ε
If the stored freeze frame data is as follows:		
Engine speed: 850 rpm, Calculated load value: 30%, Engine coolant temperature: 80°C (176°F) To be satisfied with driving pattern C, the vehicle should run under the following conditions: Engine speed: 475 - 1,225 rpm, Calculated load value: 27 - 33%, Engine coolant temperature: mc (158°F)	pre than 70°C	F
<ul> <li>The C counter will be cleared when the malfunction is detected regardless of vehicle conditions</li> <li>The C counter will be counted up when vehicle conditions above is satisfied without the same r</li> <li>The DTC will not be displayed after C counter reaches 80.</li> </ul>	above. nalfunction.	G
• The 1st trip DTC will be cleared when C counter is counted once without the same malfunction stored in ECM.	after DTC is	Н
Explanation for Driving Patterns Except for "Misfire <exhaust deterioration="" quality="">", "Fuel Injection S <driving a="" pattern=""></driving></exhaust>		ا ل
70 (158)		K
40 (104) 20 (68) (2) Engine coolant temperature should change m (68°F) after starting engine.		К
IGN ON IGN OFF		L
rpm (3) ignition switch should be changed itom on to or 1		М
400		N
	AEC574	
<ul> <li>The A counter will be cleared when the malfunction is detected regardless of (1) - (4).</li> <li>The A counter will be counted up when (1) - (4) are satisfied without the same malfunction.</li> <li>The DTC will not be displayed after the A counter reaches 40.</li> <li>- Oriving Pattern B&gt;</li> </ul>		0
<ul> <li>Driving pattern B means the vehicle operation as follows:</li> <li>All components and systems should be monitored at least once by the OBD system.</li> <li>The B counter will be cleared when the malfunction is detected once regardless of the driving pattern B is satisfied without any malfunctions.</li> <li>The MIL will go off when the B counter reaches 3 (*2 in OBD SYSTEM OPERATION CHART).</li> </ul>	attem.	Ρ
Diagnosis Tool Function	INFOID:000000004899627	
DESCRIPTION		

# www.digitalkhodro.com

# [MR20DE]

#### < FUNCTION DIAGNOSIS >

Generic Scan Tool (OBDII scan tool) complying with ISO 15031-5 has several functions explained below. ISO9141 is used as the protocol.

The name "GST" or "Generic Scan Tool" is used in this service manual.



## FUNCTION

Diagnostic Service		Function
Service \$01	READINESS TESTS	This diagnostic service gains access to current emission-related data values, including an- alog inputs and outputs, digital inputs and outputs, and system status information.
Service \$02	(FREEZE DATA)	This diagnostic service gains access to emission-related data value which were stored by ECM during the freeze frame. For details, refer to EC-272. "DTC_Index".
Service \$03	DTCs	This diagnostic service gains access to emission-related power train trouble codes which were stored by ECM.
Service \$04	CLEAR DIAG INFO	<ul> <li>This diagnostic service can clear all emission-related diagnostic information. This includes:</li> <li>Clear number of diagnostic trouble codes (Service \$01)</li> <li>Clear diagnostic trouble codes (Service \$03)</li> <li>Clear trouble code for freeze frame data (Service \$01)</li> <li>Clear freeze frame data (Service \$02)</li> <li>Reset status of system monitoring test (Service \$01)</li> <li>Clear on board monitoring test results (Service \$06 and \$07)</li> </ul>
Service \$06	(ON BOARD TESTS)	This diagnostic service accesses the results of on board diagnostic monitoring tests of specific components/systems that are not continuously monitored.
Service \$07	(ON BOARD TESTS)	This diagnostic service enables the off board test drive to obtain test results for emission- related powertrain components/systems that are continuously monitored during normal driving conditions.
Service \$08	_	This diagnostic service is not applicable on this vehicle.
Service \$09	(CALIBRATION ID)	This diagnostic service enables the off-board test device to request specific vehicle infor- mation such as Vehicle Identification Number (VIN) and Calibration IDs.

#### INSPECTION PROCEDURE

- 1. Turn ignition switch OFF.
- 2. Connect "GST" to data link connector, which is located under LH dash panel near the hood opener handle.
- 3. Turn ignition switch ON.
- Enter the program according to instruction on the screen or in the operation manual. (\*: Regarding GST screens in this section, sample screens are shown.)

VTX GENERIC OBD II PROGRAM CARD	
 Press (ENTER)	
Sample screen* SER	398S

# www.digitalkhodro.com

# ON BOARD DIAGNOSTIC (OBD) SYSTEM

# < FUNCTION DIAGNOSIS >

- 5. Perform each diagnostic mode according to each service procedure.
- For further information, see the GST Operation Manual of the tool maker.



شرکت دیجیتال خودرو سامانه (مسئولیت محدود)

# ولین سامانه دیجیتال تعمیر کاران خودرو در ایران

· · · ·

-

.

# www.digitalkhodro.com

Ε

F

G

Н

J

K

L

Μ

Ν

0

۰P

# 021-62999292

www.digitall	khodro.com			www.digitalkhodro.cor
< COM	ONENT DIAGN		UPPLY AND GROUND CIRCUIT	[MR20DE]
CON	<b>IPONEN</b>	T DIAGN	OSIS	
POW	ER SUPPLY	AND GRC	OUND CIRCUIT	
Diagno	sis Procedu	е		INFOID:000000004899831
1.сне	CK GROUND CO	ONNECTION		
2. Che <u>Is the in</u> YES NO	<ul> <li>&gt;&gt; GO TO 2.</li> <li>&gt;&gt; Repair or repair</li> </ul>	ction E21 and E ormal? place ground co	E38. Refer to Ground Inspection in <u>GI-40, "C</u> nnection. OR OPEN AND SHORT	<u>ircuít Inspection"</u> .
1. Disc	onnect ECM ha	ness connector		<u></u>
Conne	ECM tor Terminal	Ground	Continuity	
F7	10 11 108	Ground	Existed	
<u>Is the in</u> YES NO	check harness spection result n >> GO TO 4. >> GO TO 3. ECT MALFUNCT	ormal?	er. مرکت دیجیتال خو	
Check ti Harne	ne following. ss connectors F ss for open or sh	ال تعر <mark>ج</mark> 1, E7	M and ground	
<b>4.</b> CHE	>> Repair open CK ECM POWE		to power in harness or connectors. CUIT-I	
2. Turi	onnect ECM har ignition switch ck the voltage b	ON.	s. rness connector terminals.	
· · · · ·	ECM	· · ·		

Connector	+	-	Voltage
	Terminal	Terminal	
E16	93	108	Battery voltage

Is the inspection result normal?

YES >> GO TO 6.

NO >> GO TO 5.

# 5. DETECT MALFUNCTIONING PART

Check the following.

10 A fuse (No. 54)
Harness connectors M77, E105

· Harness for open or short between ECM and fuse

>> Repair open circuit or short to ground or short to power in harness or connectors.

# EC-84

.

# POWER SUPPLY AND GROUND CIRCUIT

< COMPONENT DIAGNOSIS >

www.digitalkhodro.com

[MR20DE]

6.CHECK ECM POWER SUPPLY CIRCUIT-II А Turn ignition switch OFF and wait at least 10 seconds. 1. Turn ignition switch ON. 2. Check the voltage between ECM harness connector terminals under the following condition. EC ECM Voltage Condition C + Connector Terminal Terminal After turning ignition switch OFF, battery voltage will exist Ignition switch:  $ON \rightarrow OFF$ E16 105 108 for a few seconds, then drop approximately OV. D Is the inspection result normal? YES >> GO TO 7. Е NO >> GO TO 9. 7.CHECK ECM POWER SUPPLY CIRCUIT-III 1. Turn ignition switch ON. F Check the voltage between IPDM E/R harness connector and ground. 2. IPDM E/R G Ground Voltage Connector Terminal 10 E11 Ground Battery voltage Н Is the inspection result normal? YES >> GO TO 8. NO >> Replace IPDM E/R. **O.**CHECK INTERMITTENT INCIDENT Refer to GI-38. "Intermittent Incident". J >> INSPECTION END 9. CHECK ECM POWER SUPPLY CIRCUIT-IV K Turn ignition switch OFF and wait at least 10 seconds. 1. Check the voltage between ECM harness connector terminals. 2. Ł ECM Voltage 4 Μ Terminal Connector Terminal Connector F7 32 E16 108 Battery voltage Is the inspection result normal? Ν YES >> GO TO 13. NO >> GO TO 10. **10.**CHECK ECM POWER SUPPLY CIRCUIT-V O 1. Disconnect ECM harness connector. 2. Disconnect IPDM E/R harness connector. Check the continuity between ECM harness connector and IPDM E/R harness connector. 3. Ρ

ECM		IPDM É/R		Continuity
Connector	Terminal	Connector	Terminal	Containaity
F7	32	E11	15	Existed

4. Also check harness for short to ground and short to power.

is the inspection result normal?

# POWER SUPPLY AND GROUND CIRCUIT

www.digitalkhodro.com

[MR20DE]

YES >> GO TO 12. NO >> GO TO 11.

11. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E6, F123
- Harness for open or short between ECM and IPDM E/R

>> Repair open circuit or short to ground or short to power in harness or connectors.

# 12.CHECK 20A FUSE

1. Remove 20A fuse (No. 52) from IPDM E/R.

2. Check 20Å fuse.

Is the inspection result normal?

YES >> GO TO 14.

NO >> Replace 20A fuse.

13. CHECK ECM POWER SUPPLY CIRCUIT-VI

1. Disconnect ECM harness connector.

2. Disconnect IPDM E/R harness connector.

3. Check the continuity between ECM harness connector and IPDM E/R harness connector.

E	СМ	IPDN	Continuity	
Connector	Terminal	Connector	Terminal	Continuity
E16	105	E11	9	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 14.

NO >> Repair open circuit or short to ground or short power in harness or connectors.

14.CHECK INTERMITTENT INCIDENT

Refer to GI-38, "Intermittent Incident".

Is the inspection result normal?

YES >> Replace IPDM E/R.

NO >> Repair or replace harness or connectors.

# U1000, U1001 CAN COMM CIRCUIT

# < COMPONENT DIAGNOSIS >

# U1000, U1001 CAN COMM CIRCUIT

# Description

CAN (Controller Area Network) is a serial communication line for real time application. It is an on-vehicle mul-ËĊ tiplex communication line with high data communication speed and excellent error detection ability. Many electronic control units are equipped onto a vehicle, and each control unit shares information and links with other control units during operation (not independent). In CAN communication, control units are connected with 2 communication lines (CAN H line, CAN L line) allowing a high rate of information transmission with less wiring. Each control unit transmits/receives data but selectively reads required data only.

# DTC Logic

INFOID.000000004899833 D

#### DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
U1000	CAN communication	When ECM is not transmitting or receiving CAN com- munication signal of OBD (emission-related diagno- sis) for 2 seconds or more.	Harness or connectors     (CAN communication line is open or
U1001	line	When ECM is not transmitting or receiving CAN com- munication signal other than OBD (emission-related diagnosis) for 2 seconds or more.	shorted)
TC CON	FIRMATION PRO	CEDURE	
.PERFO	RM DTC CONFIRM	ATION PROCEDURE	Q .
		d wait at least 3 seconds.	
	1st trip DTC. DTC detected?	شركت ديحيتال خودروسا	
S ISCHIP L			
YES >>	EC-87, "Diagnosis	Procedure".	
	EC-87, "Diagnosis	N	
NO >>			INFQID:00000000489983
NO >> Diagnosi	NSPECTION END	اولين سامانه ديجيتال تعم	INFC/D:00000000469983
NO >> Diagnosi	INSPECTION END	اولين سامانه ديجيتال تعم	INFOID:00000000485983
NO >> Diagnosi	NSPECTION END	اولين سامانه ديجيتال تعم	INFC/ID:00000000489983

А

С

F

Μ

Ν

0

P

[MR20DE]

INFOID 00000004899832

# 021-62999292

# U1010 CONTROL UNIT (CAN)

# < COMPONENT DIAGNOSIS >

# U1010 CONTROL UNIT (CAN)

# Description

CAN (Controller Area Network) is a serial communication line for real time application. It is an on-vehicle multiplex communication line with high data communication speed and excellent error detection ability. Many electronic control units are equipped onto a vehicle, and each control unit shares information and links with other control units during operation (not independent). In CAN communication, control units are connected with 2 communication lines (CAN H line, CAN L line) allowing a high rate of information transmission with less wiring. Each control unit transmits/receives data but selectively reads required data only.

# DTC Logic

INFOID:000000004899836

INFOID:000000004899837

#### DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
U1010	CAN communication bus	When detecting error during the initial diagno- sis of CAN controller of ECM.	• ECM

# DTC CONFIRMATION PROCEDURE

# **1.**PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON.

2. Check 1st trip DTC.

#### Is 1st trip DTC detected?

YES >> Go to EC-88. "Diagnosis Procedure".

NO >> INSPECTION END

# **Diagnosis** Procedure

**1.INSPECTION START** 

- 1. Erase DTC.
- 2. Perform DTC CONFIRMATION PROCEDURE.
- See EC-88, "DTC Logic".

3. Check DTC.

#### Is the DTC U1010 displayed again?

YES >> GO TO 2.

NO >> INSPECTION END

# 2.REPLACE ECM

1. Replace ECM.

2. Go to EC-13, "ADDITIONAL SERVICE WHEN REPLACING CONTROL UNIT : Special Repair Requirement".

>> INSPECTION END

# 021-62999292

[MR20DE]

INFOID:000000004899835

# DOUT INT CONTROL

COMPONENT DIAGNOSIS >         P0011 IVT CONTROL         DTC Logic         DTC DETECTION LOGIC         IOTE:         DTC P0011 is displayed with DTC P1111, first perform the troub         DTC No.       Trouble diagnosis name         DTC No.       Trouble diagnosis name         P0011       Intake valve timing control performance         There is a gap between angle of target and phase-control angle degree.         Diagnosis Procedure         .CHECK OIL PRESSURE WARNING LAMP         Start engine.	[MR20DE] WFOID:00000004699830 Dele diagnosis for EC-164, "DTC Logic". Possible cause Possible cause • Crankshaft position sensor (POS) • Camshaft position sensor (PHASE) • Intake valve control solenoid valve • Accumulation of debris to the signal pick-up portion of the camshaft • Timing chain installation • Foreign matter caught in the oil groove for in- take valve timing control
DTC Logic         DTC DETECTION LOGIC         IOTE:         DTC P0011 is displayed with DTC P1111, first perform the troub         DTC No.       Trouble diagnosis name         DTC No.       Trouble diagnosis name         P0011       Intake valve timing control performance         There is a gap between angle of target and phase-control angle degree.         Diagnosis Procedure         .CHECK OIL PRESSURE WARNING LAMP	Possible cause  Crankshaft position sensor (POS) Camshaft position sensor (PHASE) Intake valve control solenoid valve Accumulation of debris to the signal pick-up portion of the camshaft Timing chain installation Foreign matter caught in the oil groove for in- take valve timing control
DTC DETECTION LOGIC         NOTE:       DTC P0011 is displayed with DTC P1111, first perform the troub         DTC No.       Trouble diagnosis name       Detecting condition         P0011       Intake valve timing control performance       There is a gap between angle of target and phase-control angle degree.         Diagnosis Procedure       .CHECK OIL PRESSURE WARNING LAMP	Possible cause  Crankshaft position sensor (POS) Camshaft position sensor (PHASE) Intake valve control solenoid valve Accumulation of debris to the signal pick-up portion of the camshaft Timing chain installation Foreign matter caught in the oil groove for in- take valve timing control
IOTE:       Iote Pool 11 is displayed with DTC P1111, first perform the troub         DTC No.       Trouble diagnosis name       Detecting condition         P0011       Intake valve timing control performance       There is a gap between angle of target and phase-control angle degree.         Diagnosis Procedure       .CHECK OIL PRESSURE WARNING LAMP	Possible cause     Possible cause     Crankshaft position sensor (POS)     Camshaft position sensor (PHASE)     Intake valve control solenoid valve     Accumulation of debris to the signal pick-up     portion of the camshaft     Timing chain installation     Foreign matter caught in the oil groove for in-     take valve timing control
IOTE:       Iote Pool 11 is displayed with DTC P1111, first perform the troub         DTC No.       Trouble diagnosis name       Detecting condition         P0011       Intake valve timing control performance       There is a gap between angle of target and phase-control angle degree.         Diagnosis Procedure       .CHECK OIL PRESSURE WARNING LAMP	Possible cause Crankshaft position sensor (POS) Camshaft position sensor (PHASE) Intake valve control solenoid valve Accumulation of debris to the signal pick-up portion of the camshaft Timing chain installation Foreign matter caught in the oil groove for in- take valve timing control
DTC No.       Trouble diagnosis name       Detecting condition         P0011       Intake valve timing control performance       There is a gap between angle of target and phase-control angle degree.         Diagnosis Procedure       .CHECK OIL PRESSURE WARNING LAMP	Possible cause Crankshaft position sensor (POS) Camshaft position sensor (PHASE) Intake valve control solenoid valve Accumulation of debris to the signal pick-up portion of the camshaft Timing chain installation Foreign matter caught in the oil groove for in- take valve timing control
Direction     name     Detecting condition       P0011     Intake valve timing control performance     There is a gap between angle of target and phase-control angle degree.       Diagnosis Procedure     .CHECK OIL PRESSURE WARNING LAMP	<ul> <li>Crankshaft position sensor (POS)</li> <li>Camshaft position sensor (PHASE)</li> <li>Intake valve control solenoid valve</li> <li>Accumulation of debris to the signal pick-up portion of the camshaft</li> <li>Timing chain installation</li> <li>Foreign matter caught in the oil groove for intake valve timing control</li> </ul>
P0011       Intake valve timing control performance       There is a gap between angle of target and phase-control angle degree.         Diagnosis Procedure       .CHECK OIL PRESSURE WARNING LAMP	<ul> <li>Camshaft position sensor (PHASE)</li> <li>Intake valve control solenoid valve</li> <li>Accumulation of debris to the signal pick-up portion of the camshaft</li> <li>Timing chain installation</li> <li>Foreign matter caught in the oil groove for intake valve timing control</li> </ul>
CHECK OIL PRESSURE WARNING LAMP	INFOID:00000004899839
CHECK OIL PRESSURE WARNING LAMP	· · · · · · · · · · · · · · · · · · ·
	, ·, ·.
. Check oil pressure warning lamp and confirm it is not illumi-	
s oil pressure warning lamp illuminated?	
YES >> Go to <u>LU-14, "Inspection"</u> . NO >> GO TO 2.	
شرکت دیجیتال خودرو سامانه (مسئولیت محا	
اولین سامانه دیجیتال تعمیر کاران خودرو در ای	
CHECK INTAKE VALVE TIMING CONTROL SOLENOID VALVE	PBIA6556J
Refer to EC-90, "Component Inspection".	
s the inspection result normal?	k
YES >> GO TO 3. NO >> Replace intake valve timing control solenoid valve.	
CHECK CRANKSHAFT POSITION SENSOR (POS)	
lefer to EC-150, "Component Inspection".	· · · · · · · · · · · · · · · · · · ·
s the inspection result normal?	1
YES >> GO TO 4.	,
NO >> Replace crankshaft position sensor (POS).	
CHECK CAMSHAFT POSITION SENSOR (PHASE)	<u>.                                    </u>
Refer to EC-153, "Component Inspection".	
s the inspection result normal?	
YES >> GO TO 5. NO >> Replace camshaft position sensor (PHASE).	
D.CHECK CAMSHAFT (INTAKE)	

Check the following.

# P0011 IVT CONTROL

# www.digitalkhodro.com

INFOID:000000004899840

# < COMPONENT DIAGNOSIS >

- Accumulation of debris to the signal plate of camshaft (1) rear end
- Chipping signal plate of camshaft rear end

# Is the inspection result normal?

YES >> GO TO 6.

NO >> Remove debris and clean the signal plate of camshaft rear end or replace camshaft.



# 6. CHECK TIMING CHAIN INSTALLATION

Check service records for any recent repairs that may cause timing chain misaligned.

Are there any service records that may cause timing chain misaligned?

YES >> Check timing chain installation. Refer to <u>EM-165</u>, "Removal and Installation". NO >> GO TO 7.

7. CHECK LUBRICATION CIRCUIT

Refer to EM-179, "Inspection".

Is the inspection result normal?

YES >> GO TO 8.

NO >> Clean lubrication line.

8. CHECK INTERMITTENT INCIDENT

Refer to GI-38, "Intermittent Incident".

>> INSPECTION END

Component Inspection

# 1.CHECK INTAKE VALVE TIMING CONTROL SOLENOID VALVE-I

1. Turn ignition switch OFF.

- 2. Disconnect intake valve timing control solenoid valve harness connector.
- 3. Check resistance between intake valve timing control solenoid valve terminals as follows.

Terminals	Resistance [at 20°C (68°F)]
1 and 2	6.7 - 7.7 Ω
1 or 2 and ground	$\infty \Omega$ (Continuity should not exist)

Is the inspection result normal?

YES >> GO TO 2.

NO >> Replace intake valve timing control solenoid valve.

**2.**CHECK INTAKE VALVE TIMING CONTROL SOLENOID VALVE-II

1. Remove intake valve timing control solenoid valve.

 Apply 12V between intake valve timing control solenoid valve terminals 1 and 2, and then interrupt it. Make sure that the plunger moves as shown in the figure. CAUTION:

Do not apply 12V continuously for 5 seconds or more. Doing so may result in damage to the coil in intake valve timing control solenoid valve. NOTE:

Always replace O-ring when intake valve timing control solenoid valve is removed.

Is the inspection result normal?



# P0011 IVT CONTROL

[MR20DE] < COMPONENT DIAGNOSIS > >> INSPECTION END YES NO >> Replace intake valve timing control solenoid valve. А EC С D Ε F G Н I J ŗ K L М Ν 0 Ρ ÷

# **P0102, P0103 MAF SENSOR**

#### < COMPONENT DIAGNOSIS >

# P0102, P0103 MAF SENSOR

# Description

The mass air flow sensor (1) is placed in the stream of intake air. It measures the intake flow rate by measuring a part of the entire intake flow. The mass air flow sensor controls the temperature of the hot wire to a certain amount. The heat generated by the hot wire is reduced as the intake air flows around it. The more air, the greater the heat loss.

Therefore, the electric current supplied to hot wire is changed to maintain the temperature of the hot wire as air flow increases. The ECM detects the air flow by means of this current change.

# DTC Logic

DTC DETECTION LOGIC

	DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
	P0102	Mass air flow sensor circuit low input	An excessively low voltage from the sensor is sent to ECM.	<ul> <li>Harness or connectors (The sensor circuit is open or shorted.)</li> <li>Intake air leaks</li> <li>Mass air flow sensor</li> </ul>
1	P0103	Mass air flow sensor circuit high input	An excessively high voltage from the sensor is sent to ECM.	<ul> <li>Harness or connectors (The sensor circuit is open or shorted.)</li> <li>Mass air flow sensor</li> </ul>

#### DTC CONFIRMATION PROCEDURE

# 1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

Which DTC is detected?

P0102 >> GO TO 2.

P0103 >> GO TO 3.

# 2.PERFORM DTC CONFIRMATION PROCEDURE FOR DTC P0102

Start engine and wait at least 5 seconds. 1.

2. Check DTC.

#### Is DTC detected?

YES >> Go to EC-93, "Diagnosis Procedure".

NO >> INSPECTION END

# **3.** PERFORM DTC CONFIRMATION PROCEDURE FOR DTC P0103-I

- 1. Turn ignition switch ON and wait at least 5 seconds.
- 2. Check DTC.

#### Is DTC detected?

YES >> Go to EC-93, "Diagnosis Procedure".

NO >> GO TO 4.

## 4.PERFORM DTC CONFIRMATION PROCEDURE FOR DTC P0103-II

1. Start engine and wait at least 5 seconds.

Check DTC. 2.

#### Is DTC detected?

YFS >> Go to EC-93, "Diagnosis Procedure".



www.digitalkhodro.com

PRIAOSSO

INFO/D:00000000489984;

# P0102, P0103 MAF SENSOR

www.digitalkhodro.com

	ENT DIAGNC					[MR20DE]
IO >> I	NSPECTION	END				
agnosis	Procedure					FOID:000000004899843
INSPECT	ION START					
	letected DTC.					
	s detected?					¥
0102 >> ( 0103 >> (						
CHECK IN	TAKE SYSTE	EM			<u>1</u>	
Air duct	lowing for cor	nection.				4
/acuum ho ntake air p		en air duct t	o intake manifol	d		
the inspec	tion result nor	mal?				
	SO TO 3.	narta				
	Reconnect the	•				
	tion switch Of			<u>.</u>		
			E38. Refer to C	around Inspe	ection in <u>GI-40, "Circuit Inspect</u>	<u>ion"</u> .
	tion result nor	mal?				
	GO TO 4. Repair or repla	ce around c	connection			
LUSCOND	-ci mass an m	OW (IVIAH) SE	ensor harness co	onnector		
. Turn igni	tion switch Of	lou on	ensor harness co		<b>ن</b> ش	
. Turn igni	tion switch Of	lou on	ensor harness co		d ground.	
Turn igni Check th	tion switch Of e voltage betv	loluio.	ensor harness o		d ground.	ſ
Turn igni Check th MAF	tion switch Of	loluio.			nd ground.	
Turn igni Check th MAF Connector	tion switch ON e voltage betv sensor	N. ween MAF s Ground	ensor harness o Voltage		nd ground.	
Turn igni Check th MAF Connector E18	tion switch ON e voltage betw sensor Terminal 5	N. ween MAF s Ground Ground	ensor harness o		nd ground.	
Turn igni Check th MAF Connector E18 the inspec YES >> 0	tion switch Of e voltage betw sensor Terminal 5 tion result nor 30 TO 5.	N. ween MAF s Ground Ground mal?	ensor harness o Voltage Battery voltage	connector an		
Turn igni Check th MAF Connector E18 the inspec YES >> ( NO >> F	tion switch Office voltage betw sensor Terminal 5 tion result nor 30 TO 5. Repair open ci	N. ween MAF s Ground Ground mal? ircuit or shor	ensor harness o Voltage Battery voltage t to ground or si	onnector an - - - nort to powe	r in harness or connectors.	
Turn igni Check th MAF Connector E18 the inspec YES >> 0 NO >> F	tion switch Of e voltage betw sensor Terminal 5 tion result nor GO TO 5. Repair open ci	N. ween MAF s Ground Ground mal? ircuit or shor	ensor harness o Voltage Battery voltage	onnector an - - - nort to powe	r in harness or connectors.	
Turn igni Check th MAF Connector E18 the inspec YES >> ( NO >> F CHECK M Turn igni	tion switch Office voltage betw sensor Terminal 5 tion result nor GO TO 5. Repair open ci IAF SENSOR tion switch Office	N. ween MAF s Ground Ground mal? ircuit or shor GROUND C	ensor harness o Voltage Battery voltage t to ground or sh CIRCUIT FOR C	onnector an - - - nort to powe	r in harness or connectors.	
Turn igni Check th MAF Connector E18 the inspec (ES >> ( NO >> F .CHECK M Turn igni Disconne	tion switch Office voltage betw sensor Terminal 5 tion result nor GO TO 5. Repair open ci IAF SENSOR tion switch Office tect ECM harne	N. ween MAF s Ground Ground mal? ircuit or shor GROUND C FF. ess connecto	ensor harness o Voltage Battery voltage t to ground or sh CIRCUIT FOR C	onnector an	r in harness or connectors.	· · · · ·
Turn igni Check th MAF Connector E18 the inspec YES >> ( NO >> F CHECK M Turn igni Disconne	tion switch Office voltage betw sensor Terminal 5 tion result nor GO TO 5. Repair open ci IAF SENSOR tion switch Office tect ECM harne	N. ween MAF s Ground Ground mal? ircuit or shor GROUND C FF. ess connecto	ensor harness o Voltage Battery voltage t to ground or sh CIRCUIT FOR C	onnector an	r in harness or connectors.	
Turn igni Check th MAF Connector E18 the inspec (ES >> ( NO >> F .CHECK M Turn igni Disconne Check th	tion switch Office voltage betw sensor Terminal 5 tion result nor GO TO 5. Repair open ci IAF SENSOR tion switch Office tect ECM harne	N. ween MAF s Ground Ground mal? ircuit or shor GROUND C FF. ess connecto etween MAF	ensor harness o Voltage Battery voltage t to ground or sh CIRCUIT FOR C	onnector and 	r in harness or connectors.	
Turn igni Check th MAF Connector E18 the inspec YES >> ( NO >> F CHECK M Turn igni Disconne Check th	tion switch Of e voltage betw sensor Terminal 5 tion result nor GO TO 5. Repair open ci IAF SENSOR tion switch Of ect ECM harne te continuity b	N. ween MAF s Ground Ground mal? ircuit or shor GROUND C FF. ess connecto etween MAF	ensor harness o Voltage Battery voltage t to ground or sh CIRCUIT FOR C or. 5 sensor harnes	onnector an	r in harness or connectors.	
Turn igni Check th MAF Connector E18 the inspec YES >> 0 NO >> F O.CHECK M Disconne Check th MAF Connector E18	tion switch Of e voltage betw sensor Terminal 5 tion result nor GO TO 5. Repair open ci IAF SENSOR tion switch Of ect ECM harne tion switch Of ect ECM harne sensor Terminal 4	N. ween MAF s Ground Ground mal? ircuit or shor GROUND C FF. ess connector EF. ess connector F8	ensor harness of Voltage Battery voltage t to ground or sh CIRCUIT FOR O or. ESENSOR harness ECM Terminal 52	onnector and onnector and onector powe PEN AND S s connector Continuity Existed	r in harness or connectors.	· · · ·
Turn igni Check th MAF Connector E18 the inspec YES >> 0 YES >> 0 CHECK M Turn igni Disconne Check th MAF Connector E18 Also che	tion switch Of e voltage betw sensor Terminal 5 tion result nor GO TO 5. Repair open ci IAF SENSOR tion switch Of ect ECM harmonic te continuity b sensor Terminal 4 ck harness fo	N. ween MAF s Ground Ground mal? ircuit or shor GROUND C F. ess connector F. ess connector F. ess connector F. ess connector F. ess connector F. ess connector	ensor harness of Voltage Battery voltage t to ground or sh CIRCUIT FOR O or. 5 sensor harness ECM Terminal	onnector and onnector and onector powe PEN AND S s connector Continuity Existed	r in harness or connectors.	
Turn igni Check th MAF Connector E18 the inspec YES >> 0 NO >> F O.CHECK M Turn igni Disconne Check th MAF Connector E18 Also che s the inspec	tion switch Of e voltage betw sensor Terminal 5 tion result nor GO TO 5. Repair open ci IAF SENSOR tion switch Of ect ECM harne tion switch Of ect ECM harne	N. ween MAF s Ground Ground mal? ircuit or shor GROUND C F. ess connector F. ess connector F. ess connector F. ess connector F. ess connector F. ess connector	ensor harness of Voltage Battery voltage t to ground or sh CIRCUIT FOR O or. ESENSOR harness ECM Terminal 52	onnector and onnector and onector powe PEN AND S s connector Continuity Existed	r in harness or connectors.	· · · ·
Turn igni Check th MAF Connector E18 The inspec YES >> 0 CHECK M Turn igni Disconne Check th MAF Connector E18 Aiso che sthe inspec YES >> 0	tion switch Of e voltage betw sensor Terminal 5 tion result nor GO TO 5. Repair open ci IAF SENSOR tion switch Of ect ECM harnes tion switch Of ect ECM harnes tion switch Of ect ECM harnes tion switch Of ect ECM harnes tion result nor GO TO 7.	N. ween MAF s Ground Ground mal? ircuit or shor GROUND C F. ess connector F. ess connector F. ess connector F. ess connector F. ess connector F. ess connector	ensor harness of Voltage Battery voltage t to ground or sh CIRCUIT FOR O or. ESENSOR harness ECM Terminal 52	onnector and onnector and onector powe PEN AND S s connector Continuity Existed	r in harness or connectors.	
Turn igni Check th MAF Connector E18 the inspec YES >> ( NO >> F O.CHECK M Disconne Check th MAF Connector E18 Also che sthe inspec YES >> ( NO >> (	tion switch Office voltage betw sensor Terminal 5 tion result nor GO TO 5. Repair open ci AF SENSOR tion switch Office te continuity b sensor Terminal 4 ck harness fo tion result nor GO TO 7. GO TO 6.	N. ween MAF s Ground Ground mal? ircuit or shor GROUND C F. ess connector F. ess connector F. ess connector F. ess connector F. ess connector F. ess connector F. ess connector F.	ensor harness of Voltage Battery voltage t to ground or sh CIRCUIT FOR C or. ECM Terminal 52 Dund and short t	onnector and onnector and onector powe PEN AND S s connector Continuity Existed	r in harness or connectors.	
Turn igni Check th MAF Connector E18 Sthe inspec YES >> ( NO >> F O.CHECK M Disconne Check th MAF Connector E18 Also che Sthe inspec YES >> ( NO >> (	tion switch Office voltage between voltage voltage between voltage voltage between voltage vol	N. ween MAF s Ground Ground mal? ircuit or shor GROUND C F. ess connector F. ess connector F. ess connector F. ess connector F. ess connector F. ess connector F. ess connector F.	ensor harness of Voltage Battery voltage t to ground or sh CIRCUIT FOR C or. ECM Terminal 52 Dund and short t	onnector and onnector and onector powe PEN AND S s connector Continuity Existed	r in harness or connectors.	

# P0102, P0103 MAF SENSOR

< COMPONENT DIAGNOSIS >

>> Repair open circuit or short to ground or short to power in harness or connectors.

# **7.**CHECK MAF SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check the continuity between MAF sensor harness connector and ECM harness connector.

MAF	sensor	E	Continuity	
Connector	Terminal	Connector	Terminal	Continuity
E18	3	F8	45	Existed

2. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 9.

NO >> GO TO 8.

8.DETECT MALFUNCTIONING PART

Check the following.

Harness connectors F121, E7

• Harness for open or short between mass air flow sensor and ECM.

>> Repair open circuit or short to ground or short to power in harness or connectors.

#### 9. CHECK MASS AIR FLOW SENSOR

Refer to EC-94, "Component Inspection".

is the inspection result normal?

YES >> GO TO 10.

NO >> Replace mass air flow sensor.

**10.**CHECK INTERMITTENT INCIDENT

Refer to GI-38. "Intermittent Incident".

#### >> INSPECTION END

**Component Inspection** 

NFOID:000000004899844

1.CHECK MASS AIR FLOW SENSOR-I

1. Turn ignition switch OFF.

2. Reconnect all harness connectors disconnected.

3. Start engine and warm it up to normal operating temperature.

4. Check the voltage between ECM harness connector terminals.

	ECM			
Connector	+	-	Condition	Voltage
Connector	Terminal	Terminal		
			Ignition switch ON (Engine stopped.)	Approx. 0.4V
F8	45 (MAF sensor)	52	Idle (Engine is warmed-up to normal operating temperature.)	0.9 - 1.1V
	(		Idle to about 4,000 rpm	0.9 - 1.1V to Approx. 2.4V*

\*: Check for linear voltage rise in response to engine being increased to about 4,000 rpm.

#### Is the inspection result normal?

YES >> INSPECTION END

NO >> GO TO 2.

# $\mathbf{2}.$ CHECK FOR THE CAUSE OF UNEVEN AIR FLOW THROUGH MASS AIR FLOW SENSOR

1. Turn ignition switch OFF.

2. Check for the cause of uneven air flow through mass air flow sensor. Refer to following.

# 021-62999292

#### EC-94

# www.digitalkhodro

# www.digitalkhodro.c

Uneven dirt Improper spe the inspection YES >> GO NO >> GO CHECK MAS CHECK MAS CHECK MAS Check the vo EC	ducts ng seal c of air cle ecificatic result no TO 4. TO 3. S AIR FI blace ma and war blage be	of air cle eaner ele on of inta ormal? LOW SE alfunctio rm it up	aner element ement ake air system parts NSOR-II	[MR200
Malfunctionin Uneven dirt Improper spe- the inspection YES >> GO NO >> GO CHECK MAS CHECK MAS Repair or rep Start engine Check the vo	ng seal of of air cle ecification result no TO 4. TO 3. S AIR FI blace ma and war blage be	eaner ele on of inta ormal? LOW SE alfunctio rm it up	ement ake air system parts NSOR-II ning part.	
Uneven dirt Improper spe the inspection YES >> GO NO >> GO CHECK MAS CHECK MAS CHECK MAS Check the vo EC	of air cle ecificatio result no TO 4. TO 3. S AIR FI blace ma and war blage be	eaner ele on of inta ormal? LOW SE alfunctio rm it up	ement ake air system parts NSOR-II ning part.	
Improper spection Sthe inspection YES >> GO NO >> GO CHECK MAS CHECK MAS CHECK MAS CHECK MAS CHECK MAS CHECK MAS CONNECTOR EC Connector	ecification result not TO 4. TO 3. S AIR FI blace ma and war blage be made be	on of inta ormal? LOW SE alfunctio rm it up	NSOR-II ning part.	
YES >> GO NO >> GO CHECK MAS Repair or rep Start engine Check the vo EC	TO 4. TO 3. S AIR Fl blace ma and war blage be	LOW SE alfunctio rm it up	ning part. to normal operating temperature.	
NO >> GO CHECK MAS Repair or rep Start engine Check the vo EC	TO 3. S AIR FI blace ma and war bltage be	alfunctio rm it up	ning part. to normal operating temperature.	. · · · ·
CHECK MAS	S AIR Fl place ma and war pltage be M +	alfunctio rm it up	ning part. to normal operating temperature.	
. Repair or rep . Start engine . Check the vo EC Connector	blace ma and war bltage be M +	alfunctio rm it up	ning part. to normal operating temperature.	
. Start engine . Check the vo EC Connector	and war bitage be M +	rm it up '	to normal operating temperature.	
. Start engine . Check the vo EC Connector	and war bitage be M +	rm it up '	to normal operating temperature.	
Connector	+			
Connector				
.Ten	ninal	- ]	Condition	Voltage
		Terminal		
	·		Ignition switch ON (Engine stopped.)	Approx. 0.4V
	15 sensor)	52	Idle (Engine is warmed-up to normal operating temperature.)	0.9 - 1.1V
	sensur)		Idle to about 4,000 rpm	0.9 - 1.1V to Approx. 2.4V
. Start engine . Check the ve	and wai oltage be	rm it up	nsor harness connector and reconnect it again. to normal operating temperature. ECM harness connector and ground.	
· EC	M			
Connector	+	-	Condition	Voltage
Ten	minal	Terminal		
	45		Ignition switch ON (Engine stopped.)	Approx. 0.4V
	sensor)	52	Idle (Engine is warmed-up to normal operating temperature.)	0.9 - 1.1V
			Idie to about 4,000 rpm	0.9 - 1.1V to Approx. 2.4V
	-		esponse to engine being increased to about 4,000 rpm.	
s the inspection				
YES >> INSI			ss air flow sensor.	
	ar or rep			
			·	
			· · · ·	
			Ť	
			· · ·	

021-62999292

021-62999292

;

# **P0112, P0113 IAT SENSOR**

# < COMPONENT DIAGNOSIS >

# P0112, P0113 IAT SENSOR

# Description

The intake air temperature sensor is built-into mass air flow sensor (1). The sensor detects intake air temperature and transmits a signal to the ECM.

The temperature sensing unit uses a thermistor which is sensitive to the change in temperature. Electrical resistance of the thermistor decreases in response to the temperature rise.

# PB1A9559

Acceptable

#### <Reference data>

Intake air temperature [°C (°F)]	Voltage* (V)	Resistance (kΩ)
25 (77)	3.3 1.800 - 2.	
80 (176)	1.2	0.283 - 0.359

\*: These data are reference values and are measured between ECM terminals 46 (Intake air temperature sensor) and 55.



20

2 1.0 0.8

#### IFOID:000000004899846

SEF012

#### DTC DETECTION LOGIC

DTC Logic

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0112	Intake air tempera- ture sensor circuit low input	An excessively low voltage from the sensor is sent to ECM.	Hamess or connectors     (The second connectors)
P0113	Intake air tempera- ture sensor circuit high input	An excessively high voltage from the sensor is sent to ECM.	<ul><li>(The sensor circuit is open or shorted.)</li><li>Intake air temperature sensor</li></ul>

#### DTC CONFIRMATION PROCEDURE

# **1.**PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

#### >> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

Turn ignition switch ON and wait at least 5 seconds. 1.

#### Check 1st trip DTC. 2.

#### Is 1st trip DTC detected?

- YES >> Go to EC-97, "Diagnosis Procedure".
- >> INSPECTION END NO

# [MR20DE]



INFOID:00000004899845

www.digitalkhodro.com

www.digitalkhodro.com

Diagnosis	Procedure				,	INF0(0:000	00000048
<b>1.</b> CHECK G		INFOTION					
2. Check gr		ion E21 and i	E38. Refer to	Ground Inspectio	n in <u>GI-40, "Cir</u>	cuit Inspection".	
Is the inspect		<u>mal?</u>					
	O TO 2.	ace ground co	proceeding	:	,		
-	• •	-		OWER SUPPLY	CIRCUIT		
							_
2. Turn ignit	ion switch Of	N	nsor harness o ensor harness	connector and gr	ound.		
	sensor			_			·.
Connector	Terminal	Ground	Voltage		۰ .	-	
E18	2	Ground	Approx. 5V	—			
Is the inspect			· · · · · · · · · · · · · · · · · · ·	_			•
	O TO 4.	<u></u>					
-	io to 3.						
<b>3.</b> DETECT N	MALFUNCTIC	DNING PART					
					<u> </u>		
Check the fol	lowing.						
<ul> <li>Check the foll</li> <li>Harness co</li> </ul>	nnectors F12			JD		Q	
<ul> <li>Harness co</li> <li>Harness for</li> </ul>	nnectors F12 open or shoi	t between int		rature sensor and		nectors.	
• Harness co • Harness for >> F 4.CHECK IN 1. Turn ignit	open or sho open or sho lepair open c ITAKE AIR TI	t between int ircuit or short EMPERATUR	to ground or s RE SENSOR G	rature sensor and short to power in I ROUND CIRCUI	narness or conr		
Harness co     Harness for     S     S     CHECK IN     Turn ignit     Disconne	open or sho open or sho lepair open c ITAKE AIR TI ion switch Of ct ECM ham	t between int ircuit or short EMPERATUR FF. ess connecto	to ground or s RE SENSOR G	short to power in I	namess or conn T FOR OPEN	AND SHORT	
Harness co     Harness for     SF     CHECK IN     Disconne     Check th	open or sho open or sho lepair open c ITAKE AIR TI ion switch Of ct ECM ham	t between int ircuit or short EMPERATUR FF. ess connecto etween MAF	to ground or s RE SENSOR G	short to power in I BROUND CIRCUI	namess or conn T FOR OPEN	AND SHORT	
Harness co     Harness for     S> F     CHECK IN     Disconne     Check th	open or sho open or sho lepair open c ITAKE AIR TI ion switch Of ct ECM harn e continuity b	t between int ircuit or short EMPERATUR FF. ess connecto etween MAF	to ground or s RE SENSOR G r. sensor harnes	short to power in I ROUND CIRCUI	namess or conn T FOR OPEN	AND SHORT	
Harness co     Harness for     S> F     CHECK IN     Disconne     Check th     MAF	Appendix F12 open or shore lepair open c ITAKE AIR TI tion switch Offict ECM harm e continuity b sensor	t between int ircuit or short MPERATUR F. ess connecto etween MAF	to ground or s E SENSOR G r. sensor harnes	short to power in I BROUND CIRCUI	namess or conn T FOR OPEN	AND SHORT	
Harness co     Harness for     So F     A.CHECK IN     Disconne     Connector     E18     A. Also check	Appendix F12 open or shore appair open c ITAKE AIR TI ion switch Office ECM harmonic c ECM harmonic c continuity b sensor Terminal 1 ck harness fo	t between int ircuit or short MPERATUR F. ess connecto etween MAF Connector F8 r short to grou	to ground or s RE SENSOR G r. sensor harnes CM Terminal	short to power in I ROUND CIRCUI ss connector and Continuity Existed	namess or conn T FOR OPEN	AND SHORT	
Harness co     Harness for     Harness for     S     Harness for     S     CHECK IN     Disconne     Connector     E18     Also check     Is the inspect	nnectors F12 open or shor lepair open c ITAKE AIR TI ion switch Of ct ECM harne e continuity b sensor Terminal 1 ck harness fo ion result nor	t between int ircuit or short MPERATUR F. ess connecto etween MAF Connector F8 r short to grou	to ground or s E SENSOR G r. sensor harnes CM Terminal 55	short to power in I ROUND CIRCUI ss connector and Continuity Existed	namess or conn T FOR OPEN	AND SHORT	
Harness co     Harness for     Harness for     Software Stress     Harness for     Harness for     Software Stress     Harness for     Harness for     Software Stress     Harness for     Software Stress     Harness for     Software Stress     Harness for     Software Stress     Harness for     Harness for     Software Stress     Harness for     Harness for     Software Stress     Harness     Harness for     Software S	Appendix F12 open or show repair open c ITAKE AIR TI ion switch Offict ECM harmonic e continuity b sensor Terminal 1 ck harness fo ion result nor 60 TO 6.	t between int ircuit or short MPERATUR F. ess connecto etween MAF Connector F8 r short to grou	to ground or s E SENSOR G r. sensor harnes CM Terminal 55	short to power in I ROUND CIRCUI ss connector and Continuity Existed	namess or conn T FOR OPEN	AND SHORT	
Harness co     Harness for     Harness for     Software Structure     Harness for     Software Structure     Harness for     Software Structure     Harness for     Software Structure     Software Structure     YES >> C     NO >> C	Appendix F12 open or shore repair open c ITAKE AIR TI ion switch Office ct ECM harmonic ct ECM	t between int ircuit or short EMPERATUR F. ess connecto etween MAF Connector F8 r short to grou mal?	to ground or s RE SENSOR G r. sensor harnes CM Terminal 55 und and short	short to power in I ROUND CIRCUI ss connector and Continuity Existed	namess or conn T FOR OPEN	AND SHORT	
Harness co     Harness for     Harness for     Software Structure     Harness for     Harness for     Software Structure     Harness for     Harness for     Software Structure     Harness for     Harness for     Software Structure     Harness for     Harness for     Software Structure     Harness for     Software Structure     Harness for     Software Structure     Harness for     Harness for     Harness for     Software Structure     Software Structure     Harness for     Software Structure     Harness for     Software Structure     Harness for     Software Structure	Appendix F12 open or shore lepair open c ITAKE AIR TI ion switch Office ct ECM harmonic ct ECM	t between int ircuit or short EMPERATUR F. ess connecto etween MAF Connector F8 r short to grou mal?	to ground or s RE SENSOR G r. sensor harnes CM Terminal 55 und and short	short to power in I ROUND CIRCUI ss connector and Continuity Existed	namess or conn T FOR OPEN	AND SHORT	
• Harness co • Harness for >> F 4.CHECK IN 1. Turn ignif 2. Disconne 3. Check th MAF Connector E18 4. Also check Is the inspect YES $>> C$ NO $>> C$ 5.DETECT to Check the fol • Harness co	Appendix F12 open or shore lepair open c ITAKE AIR TI ion switch Office cct ECM harmonic e continuity b sensor Terminal 1 ck harness for ion result nor 60 TO 6. 60 TO 5. MALFUNCTIC lowing. nnectors F12	t between int ircuit or short MPERATUR F. ess connecto etween MAF Connector F8 r short to grou mal? DNING PART 3, E6	to ground or s RE SENSOR G r. sensor harnes CM Terminal 55 und and short	short to power in I ROUND CIRCUI ss connector and Continuity Existed	ECM harness	AND SHORT	
<ul> <li>Harness co</li> <li>Harness for</li> <li>Harness for</li> <li>A.CHECK IN</li> <li>Disconne</li> <li>Disconne</li> <li>Check th</li> <li>MAF</li> <li>Connector</li> <li>E18</li> <li>Also check</li> <li>Is the inspect</li> <li>YES &gt;&gt; C</li> <li>NO &gt;&gt; C</li> <li>DETECT I</li> <li>Check the fol</li> <li>Harness co</li> <li>Harness for</li> </ul>	Appendix F12 open or shore lepair open c ITAKE AIR TI ion switch Office cct ECM harmonic e continuity b sensor Terminal 1 ck harness fo ion result nor 60 TO 6. 60 TO 5. MALFUNCTIC lowing. nnectors F12 open or shore	t between int ircuit or short MPERATUR F. ess connecto etween MAF Connector F8 r short to grou mal? DNING PART 3, E6 rt between int	to ground or s RE SENSOR G r. sensor harnes CM Terminal 55 und and short	short to power in I BROUND CIRCUI ss connector and Continuity Existed to power.	ECM harness of conr	AND SHORT	
<ul> <li>Harness co</li> <li>Harness for</li> <li>Harness for</li> <li>A.CHECK IN</li> <li>Turn ignit</li> <li>Disconne</li> <li>Disconne</li> <li>Check th</li> <li>Connector</li> <li>E18</li> <li>Also check</li> <li>Is the inspect</li> <li>YES &gt;&gt; G</li> <li>NO &gt;&gt; G</li> <li>DETECT I</li> <li>Check the fol</li> <li>Harness co</li> <li>Harness for</li> </ul>	Annectors F12 open or show repair open c ITAKE AIR TI ion switch Office ECM harmonic e continuity b sensor Terminal 1 ck harness for ion result nor 60 TO 6. 60 TO 5. MALFUNCTIC lowing. nnectors F12 open or show Repair open c	t between int ircuit or short MPERATUR F. ess connecto etween MAF E Connector F8 r short to grou mal? DNING PART 3, E6 rt between int ircuit or short	to ground or s RE SENSOR G r. sensor harnes CM Terminal 55 und and short take air tempe to ground or s	short to power in I ROUND CIRCUI ss connector and Continuity Existed to power.	ECM harness of conr	AND SHORT	
<ul> <li>Harness co</li> <li>Harness for</li> <li>Harness for</li> <li>Second State</li> <li>A.CHECK IN</li> <li>Turn ignit</li> <li>Disconne</li> <li>Disconne</li> <li>Check the</li> <li>Connector</li> <li>E18</li> <li>A. Also check</li> <li>MAF</li> <li>Connector</li> <li>E18</li> <li>A. Also check</li> <li>Is the inspect</li> <li>YES &gt;&gt; G</li> <li>NO &gt;&gt; G</li> <li>5.DETECT I</li> <li>Check the fol</li> <li>Harness co</li> <li>Harness for</li> <li>&gt;&gt; F</li> <li>6.CHECK IN</li> </ul>	Annectors F12 open or shore lepair open c ITAKE AIR TI ion switch Office ECM harmonic e continuity b sensor Terminal 1 ck harness for ion result nor 60 TO 6. 60 TO 5. MALFUNCTIC lowing. nnectors F12 open or shore Repair open c ITAKE AIR TI	t between int ircuit or short MPERATUR F. ess connecto etween MAF E Connector F8 r short to grou mal? DNING PART 3, E6 rt between int ircuit or short EMPERATUR	to ground or s RE SENSOR G r. sensor harnes CM Terminal 55 und and short ake air tempe to ground or s RE SENSOR	short to power in I BROUND CIRCUI ss connector and Continuity Existed to power.	ECM harness of conr	AND SHORT	
<ul> <li>Harness co</li> <li>Harness for</li> <li>Harness for</li> <li>A.CHECK IN</li> <li>Turn ignit</li> <li>Disconne</li> <li>Disconne</li> <li>Check th</li> <li>Connector</li> <li>E18</li> <li>Also check</li> <li>Is the inspect</li> <li>YES &gt;&gt; G</li> <li>NO &gt;&gt; G</li> <li>DETECT I</li> <li>Check the fol</li> <li>Harness co</li> <li>Harness for</li> </ul>	Appendix F12 open or shore repair open c ITAKE AIR TI ion switch Office ECM harmonic e continuity b sensor Terminal 1 ck harness fo ion result nor GO TO 6. GO TO 5. MALFUNCTIC lowing nnectors F12 open or shore Repair open c ITAKE AIR TI 28, "Compone	t between int ircuit or short MPERATUR F. ess connecto etween MAF Connector F8 r short to grou mai? DNING PART 3, E6 rt between int ircuit or short EMPERATUR ent Inspection	to ground or s RE SENSOR G r. sensor harnes CM Terminal 55 und and short ake air tempe to ground or s RE SENSOR	short to power in I BROUND CIRCUI ss connector and Continuity Existed to power.	ECM harness of conr	AND SHORT	

# P0112, P0113 IAT SENSOR

www.digitalkhodro.com

< COMPONENT DIAGNOSIS >

# 7. CHECK INTERMITTENT INCIDENT

Refer to GI-38, "Intermittent Incident".

>> INSPECTION END

# **Component Inspection**

# 1. CHECK INTAKE AIR TEMPERATURE SENSOR

#### 1. Turn ignition switch OFF.

2. Disconnect mass air flow sensor harness connector.

3. Check resistance between mass air flow sensor terminals as follows.

Terminals	Condition		Resistance
1 and 2	Temperature °C (°F)	25 (77)	1.800 - 2.200 kΩ

Is the inspection result normal?

YES >> INSPECTION END

NO . >> Replace mass air flow sensor (with intake air temperature sensor).

شرکت دیجیتال خودرو سامانه (مسئولیت محدود)

# اولین سامانه دیجیتال تعمیر کاران خودرو در ایران

021-62999292

or).

[MR20DE]

INFOID:000000004899848

# P0117, P0118 ECT SENSOR

< COMPONENT DIAGNOSIS >

P0117, P0118 ECT SENSOR

# Description

The engine coolant temperature sensor is used to detect the engine coolant temperature. The sensor modifies a voltage signal from the ECM. The modified signal returns to the ECM as the engine coolant temperature input. The sensor uses a thermistor which is sensitive to the change in temperature. The electrical resistance of the thermistor decreases as temperature increases.



#### <Reference data>

Engine coolant temperature [°C (°F)]	Voltage* (V)	Resistance ( $k\Omega$	
-10 (14)	4.4 7.0 - 11		
20 (68)	3.5	2.1 - 2.9	
50 (122)	2.2	0.68 - 1.00	
90 (194)	0.9	0.236 - 0.260	



20

#### \*: These data are reference values and are measured between ECM terminals 38 (Engine coolant temperature sensor) and 44.

# DTC Logic

# DTC DETECTION LOGIC

DTC No.	Trouble Diagnosis Name	DTC Detecting Condition	Possible Cause	1
P0117	Engine coolant tem- perature sensor cir- cuit low input	An excessively low voltage from the sensor is sent to ECM.	<ul> <li>Hamess or connectors         (The sensor circuit is open or shorted.)</li> </ul>	Р Р
P0118	Engine coolant tem- perature sensor cir- cuit high input	An excessively high voltage from the sensor is sent to ECM.	Engine coolant temperature sensor	

#### DTC CONFIRMATION PROCEDURE

# **1.**PRECONDITIONING

Ν If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

#### >> GO TO 2.

# 2. PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON and wait at least 5 seconds.

2. Check DTC.

#### Is DTC detected?

YES >> Go to EC-100. "Diagnosis Procedure".

NO >> INSPECTION END

# www.digitalkhodro.com

# [MR20DE]

INFO/D:000000004899845

А

F

G

Н

J

0

P

INFOID:000000004899850

# P0117, P0118 ECT SENSOR

# < COMPONENT DIAGNOSIS >

**Diagnosis Procedure** 

[MR20DE]

www.digitalkhodro.com

INFOID:000000004899851

# 1. CHECK GROUND CONNECTION

1. Turn ignition switch OFF.

2. Check ground connection E21 and E38. Refer to Ground Inspection in GI-40, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.

NO >> Repair or replace ground connection.

# 2. CHECK ECT SENSOR POWER SUPPLY CIRCUIT

- 1. Disconnect engine coolant temperature (ECT) sensor harness connector.
- 2. Turn ignition switch ON.
- 3. Check the voltage between ECT sensor harness connector and ground.

ECT s	sensor	Ground	Voltage
Connector	Connector Terminal		vollage
F28	1	Ground	Approx. 5V

Is the inspection result normal?

YES >> GO TO 3.

NO >> Repair open circuit or short to ground or short to power in harness or connectors.

# $\mathbf{3}.$ CHECK ECT SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

- 1. Turn ignition switch OFF.
- 2. Disconnect ECM harness connector.
- 3. Check the continuity between ECT sensor harness connector and ECM harness connector.

ECT :	sensor	عرو ساما	Continuity	
Connector	Terminal	Connector	Terminal	Continuity
F28	2	F8	44	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 4.

NO >> Repair open circuit or short to ground or short to power in harness or connectors.

**4.**CHECK ENGINE COOLANT TEMPERATURE SENSOR

#### Refer to EC-100, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 5.

NO >> Replace engine coolant temperature sensor.

5. CHECK INTERMITTENT INCIDENT

Refer to GI-38, "Intermittent Incident".

#### >> INSPECTION END

#### **Component Inspection**

INFOID:000000004899852

# 1.CHECK ENGINE COOLANT TEMPERATURE SENSOR

- 1. Turn ignition switch OFF.
- 2. Disconnect engine coolant temperature sensor harness connector.
- 3. Remove engine coolant temperature sensor.

# www.digitalkhodro.com

4.

# P0117, P0118 ECT SENSOR

# www.digitalkhodro.com

## [MR20DE]

А

EC

С

D

Е

F

G

Н

J

Κ

L

М

Ν

0

Ρ

Terminals	-	Conditio	n i	Resistance
4			20 (68)	2.1 - 2.9 kΩ
1 and 2	Temperature	°C (°F)	50 (122)	0.68 - 1.00 kΩ
Г . 1			90 (194)	0.236 - 0.260 kΩ

Is the inspection result normal?

< COMPONENT DIAGNOSIS >

YES >> INSPECTION END

NO >> Replace engine coolant temperature sensor.





021-62999292

# P0122, P0123 TP SENSOR

www.digitalkhodro.com

[MR20DE]

INFOID:00000004899853

INFOID:00000000489985

< COMPONENT DIAGNOSIS >

P0122, P0123 TP SENSOR

# Description

Electric throttle control actuator consists of throttle control motor, throttle position sensor, etc. The throttle position sensor responds to the throttle valve movement.

The throttle position sensor has two sensors. These sensors are a kind of potentiometers which transform the throttle valve position into output voltage, and emit the voltage signal to the ECM. In addition, these sensors detect the opening and closing speed of the throttle valve and feed the voltage signals to the ECM. The ECM judges the current opening angle of the throttle valve from these signals and the ECM controls the throttle control motor to make the throttle valve opening angle properly in response to driving condition.



# **DTC Logic**

#### DTC DETECTION LOGIC

#### NOTE:

If DTC P0122 or P0123 is displayed with DTC P1229, first perform the trouble diagnosis for DTC P1229. Refer to <u>EC-202, "DTC Logic"</u>.

DTC No.	Trouble diagnosis name	DTC detecting condition	. Possible cause
P0122	Throttle position sensor 2 circuit low input	An excessively low voltage from the TP sensor 2 is sent to ECM.	Harness or connectors     (TP sensor 2 circuit is open or shorted.)
P0123	Throttle position sensor 2 circuit high input	An excessively high voltage from the TP sensor 2 is sent to ECM.	Electric throttle control actuator (TP sensor 2)

#### DTC CONFIRMATION PROCEDURE

#### 1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

#### **TESTING CONDITION:**

Before performing the following procedure, confirm that battery voltage is more than 10V at idle.

#### >> GO TO 2.

## 2.PERFORM DTC CONFIRMATION PROCEDURE

1. Start engine and let it idle for 1 second.

2. Check DTC.

Is DTC detected?

YES >> Go to <u>EC-102. "Diagnosis Procedure"</u>. NO >> INSPECTION END

# Diagnosis Procedure

INFOID:000000004899855

#### **1.**CHECK GROUND CONNECTION

- 1. Turn ignition switch OFF.
- 2. Check ground connection E21 and E38. Refer to Ground Inspection in GI-40. "Circuit Inspection".
- Is the inspection result normal?
  - YES >> GO TO 2.
  - NO >> Repair or replace ground connection.

**2.**CHECK THROTTLE POSITION SENSOR 2 POWER SUPPLY CIRCUIT

1. Disconnect electric throttle control actuator harness connector.

2. Turn ignition switch ON.

#### EC-102

www.digitalkhodro.com

<ol><li>Check the</li></ol>	e voltage betw	veen electric t	throttle contro	l actuator harness connector a	and ground.
·					
	control actuator	Ground	Voltage	· ·	
Connector	Terminal			<del>.</del> .	
F29		Ground	Approx. 5V	_	I.
YES >> 0 NO >> F	• •	rcuit or short t	-	hort to power in harness or co JND CIRCUIT FOR OPEN AN	
2. Disconne	tion switch OF ect ECM hame e continuity be	ess connector		trol actuator harness connect	or and ECM hamess cor
Electric throttle	control actuator	EC	CM	Continuity	
Connector	Terminal	Connector	Terminal	Continuity	
F29	4	F8	36	Existed	
4. Also cheo	ck harness for	short to grou	ind and short	to power.	
			-	hort to power in harness or co	
4. CHECK TI	HROTTLE PO	SITION SEN	SOR 2 INPU	SIGNAL CIRCUIT FOR OPE	IN AND SHORT
4. CHECK TI 1. Check th nector.' Electric throttle	HROTTLE PO e continuity be control actuator	SITION SEN etween electr	SOR 2 INPU	SIGNAL CIRCUIT FOR OPE	IN AND SHORT
4. CHECK TI 1. Check th nector.' Electric throttle Connector	HROTTLE PO e continuity be control actuator Terminal	SITION SEN etween electr EC Connector	SOR 2 INPU <sup>-</sup> ic throttle con CM Terminal	r SIGNAL CIRCUIT FOR OPE trol actuator harness connect Continuity	IN AND SHORT
4. CHECK TI 1. Check th nector.' Electric throttle Connector F29	HROTTLE PO e continuity be control actuator	SITION SEN etween electr EC Connector F8	SOR 2 INPU <sup>-</sup> ic throttle con CM Terminal 34	Continuity	IN AND SHORT
4. CHECK TI 1. Check th nector.' Electric throttle Connector F29 2. Also check YES >> C NO >> F 5. CHECK TI Refer to EC-1 Is the inspect YES >> C	HROTTLE PO e continuity be control actuator Terminal 3 ck harness for con result norr SO TO 5. Repair open cit HROTTLE PO 104, "Compon tion result norr	SITION SEN etween electr EC Connector F8 short to grou mal? rcuit or short to SITION SEN ent Inspectior	SOR 2 INPU ic throttle con CM Terminal 34 Ind and short to ground or s SOR	Continuity	EN AND SHORT or and ECM harness cor
4. CHECK TI         1. Check th nector.'         Electric throttle         Connector         F29         2. Also check         YES         YES         S. CHECK TI         Refer to EC-1         Is the inspect         YES         ONO         5. CHECK TI         Refer to EC-1         Is the inspect         YES         NO         SO         Also CHECK TI         Refer to EC-1         Sthe inspect         YES         SO         OLARD         YES         YES         YES         SO         Also CHECK	HROTTLE PO e continuity be control actuator Terminal 3 ck harness for ion result norr AO TO 5. Repair open cir HROTTLE PO 104, "Compon ion result norr AO TO 7. AO TO 6. ELECTRIC T	SITION SEN etween electr Connector F8 short to grou mal? rcuit or short to SITION SEN ent Inspection mal?	SOR 2 INPU ic throttle con CM Terminal 34 and and short to ground or s SOR n <sup>1</sup> .	Continuity Existed to power.	EN AND SHORT or and ECM harness cor
4. CHECK TI 1. Check th nector.' Electric throttle Connector F29 2. Also check YES $>> 0$ NO $>> F$ 5. CHECK TI Refer to EC-1 Is the inspect YES $>> 0$ NO $>> F$ 6. REPLACE 1. Replace 2. Go to EC	HROTTLE PO e continuity be control actuator Terminal 3 ck harness for ion result norr AO TO 5. Repair open cir HROTTLE PO 104, "Compon ion result norr AO TO 7. AO TO 7. AO TO 6. ELECTRIC T electric throttle 2-104, "Specia	SITION SEN etween electr Connector F8 short to grou mal? rcuit or short to SITION SEN ent Inspection mal? THROTTLE C e control actu I Repair Requ	SOR 2 INPU <sup>-</sup> ic throttle con CM Terminal 34 ind and short to ground or s SOR n <sup>a</sup> .	Continuity Existed to power.	EN AND SHORT or and ECM harness cor
4. CHECK TI 1. Check th nector.' Electric throttle Connector F29 2. Also check YES >> C NO >> F 5. CHECK TI Refer to EC-1 Is the inspect YES >> C NO >> F 6. REPLACE 1. Replace 2. Go to EC >> II	HROTTLE PO e continuity be control actuator Terminal 3 ck harness for ion result norr 0 TO 5. Repair open cir HROTTLE PO 104, "Compon ion result norr 0 TO 7. 0 TO 7. 0 TO 7. 0 TO 6. ELECTRIC T electric throttle	SITION SEN etween electr Even electr Connector F8 short to grou mai? rcuit or short to SITION SEN ent Inspection mal? HROTTLE C e control actu I Repair Requ END	SOR 2 INPU <sup>-</sup> ic throttle con CM Terminal 34 ind and short to ground or s SOR n <sup>a</sup> .	Continuity Existed to power.	EN AND SHORT or and ECM harness cor
4. CHECK TI 1. Check th nector.' Electric throttle Connector F29 2. Also check YES >> C NO >> F 5. CHECK TI Refer to EC-1 Is the inspect YES >> C NO >> C 6. REPLACE 1. Replace 2. Go to EC >> II 7. CHECK IN	HROTTLE PO e continuity be control actuator Terminal 3 ck harness for ion result norr O TO 5. Repair open cit HROTTLE PO 104, "Compon ion result norr O TO 7. O TO 7. O TO 7. O TO 6. ELECTRIC T electric throttle 2-104, "Specia NSPECTION I	SITION SEN etween electr Connector F8 short to grou mal? rcuit or short to SITION SEN ent Inspection mal? THROTTLE C e control actu I Repair Requ END T INCIDENT	SOR 2 INPU <sup>-</sup> ic throttle con CM Terminal 34 ind and short to ground or s SOR n <sup>a</sup> .	Continuity Existed to power.	EN AND SHORT or and ECM harness cor

•

•

# P0122, P0123 TP SENSOR

# < COMPONENT DIAGNOSIS >

# Component Inspection

[MR20DE]

www.digitalkhodro.com

INFO/D:000000004899856

# 1. CHECK THROTTLE POSITION SENSOR

- 1. Turn ignition switch OFF.
- 2. Reconnect all harness connectors disconnected.
- 3. Perform EC-15, "THROTTLE VALVE CLOSED POSITION LEARNING : Special Repair Requirement".
- 4. Turn ignition switch ON.
- 5. Set shift lever to D (CVT) or 1st (M/T) position.
- 6. Check the voltage between ECM harness connector terminals.

ECM				- ,	
Connector	nnector Terminal Terminal		Condition	Voltage	
Connector					
	33	· · · · · · · · · · · · · · · · · · ·	Accelerator pedal: Fully released	More than 0.36V	
F8	(TP sensor 1 signal)	36	Accelerator pedal: Fully depressed	Less than 4.75V	
10	34	30	Accelerator pedal: Fully released	Less than 4.75V	
	(TP sensor 2 signal)		Accelerator pedal: Fully depressed	More than 0.36V	

Is the inspection result normal?

YES >> INSPECTION END

NO >> GO TO 2.

# 2. REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

- 1. Replace electric throttle control actuator.
- 2. Go to EC-104, "Special Repair Requirement".

#### >> INSPECTION END

Special Repair Requirement

INFOID:000000004899857

# 1.PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Refer to EC-15. "THROTTLE VALVE CLOSED POSITION LEARNING : Special Repair Requirement"

#### >> GO TO 2.

# 2. PERFORM IDLE AIR VOLUME LEARNING

Refer to EC-15. "IDLE AIR VOLUME LEARNING : Special Repair Requirement"

>> END

P0132 HO2S1

< COMPONENT DIAGNOSIS >

#### P0132 HO2S1

#### Description

The heated oxygen sensor 1 is placed into the exhaust manifold. It detects the amount of oxygen in the exhaust gas compared to the outside air. The heated oxygen sensor 1 has a closed-end tube made of ceramic zirconia. The zirconia generates voltage from approximately 1V in richer conditions to 0V in leaner conditions. The heated oxygen sensor 1 signal is sent to the ECM. The ECM adjusts the injection pulse duration to achieve the ideal air-fuel ratio. The ideal air-fuel ratio occurs near the radical change from 1V to 0V.



# DTC Logic

#### DTC DETECTION LOGIC

To judge the malfunction, the diagnosis checks that the heated oxygen sensor 1 is not inordinately high.



DTC No.	Trouble diagnosis name	DTC detecting condition	Possible Cause	
P0132	Heated oxygen sensor 1 cir- cuit high voltage	An excessively high voltage from the sensor is sent to ECM.	<ul> <li>Hamess or connectors (The sensor circuit is open or short- ed.)</li> <li>Heated oxygen sensor 1</li> </ul>	C

## DTC CONFIRMATION PROCEDURE

# **1.**PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

>> GO TO 2.







A

Ē

F

G

Н

J

Ν

Ρ

INFOID:0000000004899859

www.digitalkhodro.com

			P0132		
	ENT DIAGNO	DSIS >			[MR20DE]
2.PERFORM	I DTC CONF	IRMATION PF	ROCEDURE		
1. Start eng         2. Turn ignit         3. Restart e         4. Check 1s         s 1st trip DT(         YES	ine and warm tion switch OF ngine and let at trip DTC. C is detected?	it up to norma F and wait at it idle for 2 min Diagnosis Pr	al operating to least 10 seco nutes.		
Diagnosis	Procedure	, ' ,		'n	INFOID:00000004899860
<b>1.</b> снеск g	ROUND CON	NECTION		•	
. Turn igni	tion switch Of	=F.	•		······································
			38. Refer to	Ground Inspec	tion in GI-40, "Circuit Inspection".
•	ion result nor	<u>mal?</u>			
	O TO 2.		-		
-		ace ground cor			
2.RETIGHT	EN HEATED	OXYGEN SEM	NSOR 1		
oosen and r	addanlada an la a ad				
Loosen and I	etignten neat	ed oxygen sen	isor 1. Refer	to <u>EM-151, "Re</u>	emoval and Installation".
	etighten heat	ed oxygen sen	isor 1. Refer	to <u>EM-151, "Re</u>	emoval and Installation".
	etignten neati	ed oxygen sen	isor 1. Refer	to <u>EM-151, "R</u> e	emoval and Installation".
>> (	GO TO 3.				emoval and Installation".
>> 0 <mark>3.снеск н</mark>	GO TO 3. 102S1 GROU	ND CIRCUIT I	FOR OPEN /	AND SHORT	emoval and Installation".
>> 0 3.CHECK H	GO TO 3. O2S1 GROU		FOR OPEN /	AND SHORT	emoval and Installation".
>> 0 .CHECK H . Disconne . Disconne	GO TO 3. O2S1 GROU ect heated oxy ect ECM harm	ND CIRCUIT I ygen sensor 1 ess connector.	FOR OPEN /	AND SHORT	nd ECM harness connector.
>> 0 .CHECK H . Disconne . Disconne	GO TO 3. O2S1 GROU ect heated oxy ect ECM harm	ND CIRCUIT I ygen sensor 1 ess connector.	FOR OPEN /	AND SHORT	
>> 0 . CHECK H . Disconne . Disconne . Check ha	GO TO 3. O2S1 GROU ect heated oxy ect ECM harm	ND CIRCUIT I ygen sensor 1 ess connector.	FOR OPEN / harness con IO2S1 harne	AND SHORT nector. ss connector a	
>> 0 . CHECK H . Disconne . Disconne . Check ha	GO TO 3. O2S1 GROU act heated oxy act ECM ham arness continu	ND CIRCUIT I ygen sensor 1 ess connector. uity between H	FOR OPEN / harness con IO2S1 harne	AND SHORT	
>> 0 . CHECK H . Disconne . Disconne . Check ha HO Connector F30	GO TO 3. O2S1 GROU ect heated oxy ect ECM harn arness continu 2S1 Terminal	ND CIRCUIT I ygen sensor 1 ess connector. uity between H EC Connector F8	FOR OPEN / harness con IO2S1 harne M Terminal 56	AND SHORT nector. ss connector a Continuity existed	
>> 0 3.CHECK H 1. Disconne 2. Disconne 3. Check ha HO Connector F30	GO TO 3. O2S1 GROU ect heated oxy ect ECM harn arness continu 2S1 Terminal	ND CIRCUIT I ygen sensor 1 ess connector. uity between H EC Connector	FOR OPEN / harness con IO2S1 harne M Terminal 56	AND SHORT nector. ss connector a Continuity existed	
>> 0 3. CHECK H Disconne Disconne Check ha HO Connector F30 Also che	GO TO 3. O2S1 GROU ect heated oxy ect ECM harn arness continu 2S1 Terminal	ND CIRCUIT ygen sensor 1 ess connector, uity between H EC Connector F8 r short to grou	FOR OPEN / harness con IO2S1 harne M Terminal 56	AND SHORT nector. ss connector a Continuity existed	
>> 0 . CHECK H . Disconne . Disconne . Check ha HO Connector F30 . Also che s the inspect YES >> 0	COTO 3. CO2S1 GROU Cot heated oxy Cot ECM harmonic COTO 4. Cot ECM harmonic Cot ECM harmonic Cot ECM harmonic Cot Forminal Cot Formin	ND CIRCUIT ygen sensor 1 ess connector. uity between H EC Connector F8 r short to grou mal?	FOR OPEN / harness con IO2S1 harne M Terminal 56 nd and short	AND SHORT nector. ss connector a Continuity existed to power.	nd ECM harness connector.
>> 0 . CHECK H . Disconne . Disconne . Check ha HO Connector F30 . Also che <u>s the inspect</u> YES >> 0 NO >> F	GO TO 3. O2S1 GROU act heated oxy act ECM harman arness continue 2S1 Terminal 1 ck harness for tion result nor GO TO 4. Repair open c	ND CIRCUIT I ygen sensor 1 ess connector. uity between H EC Connector F8 r short to grou <u>mal?</u> ircuit or short t	FOR OPEN / harness con IO2S1 harne M Terminal 56 nd and short	AND SHORT nector. ss connector a Continuity existed to power.	nd ECM harness connector.
>> 0 . CHECK H . Disconne . Disconne . Check ha HO Connector F30 . Also che <u>s the inspect</u> YES >> 0 NO >> F	GO TO 3. O2S1 GROU act heated oxy act ECM harman arness continue 2S1 Terminal 1 ck harness for tion result nor GO TO 4. Repair open c	ND CIRCUIT I ygen sensor 1 ess connector. uity between H EC Connector F8 r short to grou <u>mal?</u> ircuit or short t	FOR OPEN / harness con IO2S1 harne M Terminal 56 nd and short	AND SHORT nector. ss connector a Continuity existed to power.	nd ECM harness connector.
>> 0 3.CHECK H Disconne Disconne Check ha HO Connector F30 Also che <u>s the inspect</u> YES >> 0 NO >> F 4.CHECK H	GO TO 3. O2S1 GROU act heated oxy act ECM ham- arness continue 2S1 Terminal 1 ck harness for ion result nor GO TO 4. Repair open c IO2S1 INPUT	ND CIRCUIT I ygen sensor 1 ess connector. uity between H EC Connector F8 r short to grou <u>mal?</u> ircuit or short to SIGNAL CIRC	FOR OPEN / harness con lO2S1 harne M Terminal 56 nd and short co ground or s CUIT FOR O	AND SHORT nector. ss connector a <u>Continuity</u> existed to power. short to power PEN AND SHO	nd ECM harness connector.
>> 0 3. CHECK H Disconne Disconne Check ha HO Connector F30 Also che s the inspect YES >> 0 NO >> F 4. CHECK H	GO TO 3. O2S1 GROU act heated oxy act ECM harn arness continue 2S1 Terminal 1 ck harness for ion result nor GO TO 4. Repair open c IO2S1 INPUT arness continue	ND CIRCUIT I ygen sensor 1 ess connector. uity between H EC Connector F8 r short to grou mal? ircuit or short to SIGNAL CIRC uity between H	FOR OPEN / harness con IO2S1 harne M Terminal 56 nd and short to ground or s CUIT FOR O IO2S1 harne	AND SHORT nector. ss connector a <u>Continuity</u> existed to power. short to power PEN AND SHO	nd ECM harness connector.
>> 0 3.CHECK H 1. Disconne 2. Disconne 3. Check ha HO Connector F30 4. Also che <u>s the inspect</u> YES $>> 0$ NO $>> F$ 4.CHECK H 1. Check ha	GO TO 3. O2S1 GROU act heated oxy act ECM ham- arness continue 2S1 Terminal 1 ck harness for ion result nor GO TO 4. Repair open c IO2S1 INPUT	ND CIRCUIT I ygen sensor 1 ess connector. uity between H EC Connector F8 r short to grou <u>mal?</u> ircuit or short to SIGNAL CIRC	FOR OPEN / harness con IO2S1 harne M Terminal 56 nd and short to ground or s CUIT FOR O IO2S1 harne	AND SHORT nector. ss connector a <u>Continuity</u> existed to power. short to power PEN AND SHO	nd ECM harness connector.
>> 0 3.CHECK H Disconne Disconne Connector F30 4. Also che s the inspect YES $>> 0$ NO $>> F$ 4.CHECK H 1. Check ha	GO TO 3. O2S1 GROU act heated oxy act ECM harman 2S1 Terminal 1 ck harness for ion result nor GO TO 4. Repair open c IO2S1 INPUT arness continue 2S1	ND CIRCUIT I ygen sensor 1 ess connector. uity between H EC Connector F8 r short to grou mal? ircuit or short to SIGNAL CIRC uity between H	FOR OPEN / harness con lO2S1 harne M Terminal 56 nd and short co ground or s CUIT FOR O lO2S1 harne	AND SHORT nector. ss connector a <u>Continuity</u> <u>existed</u> to power. short to power PEN AND SHO ss connector a	nd ECM harness connector.

HO	2S1 ·	EC	M	Ground	Continuity
Connector	Terminal	Connector	Terminal	Ground	Continuity
F30	4	F8	49	Ground	Not existed

3. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 5.

>> Repair open circuit or short to ground or short to power in harness or connectors. NO

5.CHECK HO2S1 CONNECTOR FOR WATER

.

.

# www.digitalkhodro.com

digitalkhodr	o.com		D0122 H0261	www.digitalkhodro	D.CO
		<b>`</b> .	P0132 HO2S1	[MR20DE]	
	NT DIAGNOSIS		ar far watar	[	
	oxygen sensor 1 on result normal'		or for water.		А
	D TO 6.	<u>.</u>			
	pair or replace l	harness o	r connectors.		
<b>6.</b> CHECK HE	ATED OXYGEN	I SENSOF	٦1		EC
	7. "Component		<u>n"</u> .		
	on result normal'	2			С
	D TO 7. place heated ov	waen ser	isor 1		
	ERMITTENT IN				D
	"Intermittent In		16		
		<u>biddint</u> .			
>> IN:	SPECTION ENI	D			Ε
Component	Inspection			INÉCID:000000004899861	
	-				F
	ATED OXYGEN				
			al operating temperature irness connector termina		G
2. Oneckine	voltage betwee			113.	•••
	ECM				
61	+	•	Condition	Voltage	Н
Connector	Terminal	Terminal			
وليت محد F8	49 (HO2S1 signal)	برو سا 56	Engine speed held at 2,000	<ul> <li>The voltage fluctuates between 0 to 0.3V and 0.6 to 1.0V more than 5 times within 10 seconds.</li> <li>The maximum voltage is over 0.6V at least 1 time.</li> <li>The minimum voltage is below 0.3V at least 1 time.</li> <li>The voltage never exceeds 1.0V.</li> </ul>	l
ی و در ایر	(HOZOT Signal)	التعم	ipin constant under no load.	1 time: $0 - 0.3V \rightarrow 0.6 - 1.0V \rightarrow 0 - 0.3V$	0
				2 times: $0 - 0.3V \rightarrow 0.6 - 1.0V \rightarrow 0 - 0.3V \rightarrow 0.6 - 1.0V \rightarrow 0 - 0.3V$	
ls the inspectic	on result normal	 ?	· · · · · · · · · · · · · · · · · · ·		κ
•	SPECTION EN			4	
-	D TO 2.			· · · · · ·	L
2.REPLACE	HEATED OXYG	EN SENS	SOR 1		
	d oxygen senso	r 1.			
CAUTION:	heated oxyge	n sensor	which has been drops	ed from a height of more than 0.5 m (19.7	Μ
			oncrete floor; use a nev	v one.	
<ul> <li>Discard any in) onto a hat</li> </ul>					
<ul> <li>Discard any in) onto a ha</li> <li>Before insta</li> </ul>	Illing new oxyg		or, clean exhaust syst	em threads using Oxygen Sensor Thread seize lubricant (commercial service tool).	Ν
<ul> <li>Discard any in) onto a ha</li> <li>Before insta</li> </ul>	Illing new oxyg		or, clean exhaust syst	em threads using Oxygen Sensor Thread seize lubricant (commercial service tool).	N
<ul> <li>Discard any in) onto a ha</li> <li>Before insta Cleaner tool</li> </ul>	Illing new oxyg	service to	or, clean exhaust syst		
<ul> <li>Discard any in) onto a ha</li> <li>Before insta Cleaner tool</li> </ul>	Illing new oxyg (commercial s	service to	or, clean exhaust syst		N O
<ul> <li>Discard any in) onto a ha</li> <li>Before insta Cleaner tool</li> </ul>	Illing new oxyg (commercial s	service to	or, clean exhaust syst		
<ul> <li>Discard any in) onto a ha</li> <li>Before insta Cleaner tool</li> </ul>	Illing new oxyg (commercial s	service to	or, clean exhaust syst		
<ul> <li>Discard any in) onto a ha</li> <li>Before insta Cleaner tool</li> </ul>	Illing new oxyg (commercial s	service to	or, clean exhaust syst		0
<ul> <li>Discard any in) onto a ha</li> <li>Before insta Cleaner tool</li> </ul>	Illing new oxyg (commercial s	service to	or, clean exhaust syst		0
<ul> <li>Discard any in) onto a ha</li> <li>Before insta Cleaner tool</li> </ul>	Illing new oxyg (commercial s	service to	or, clean exhaust syst		0

021-62999292

P0133 HO2S1

#### < COMPONENT DIAGNOSIS >

# P0133 HO2S1

# Description

The heated oxygen sensor 1 is placed into the exhaust manifold. It detects the amount of oxygen in the exhaust gas compared to the outside air. The heated oxygen sensor 1 has a closed-end tube made of ceramic zirconia. The zirconia generates voltage from approximately 1V in richer conditions to 0V in leaner conditions. The heated oxygen sensor 1 signal is sent to the ECM. The ECM adjusts the injection pulse duration to achieve the ideal air-fuel ratio. The ideal air-fuel ratio occurs near the radical change from 1V to 0V.



Heater pad



# شرکت دیجیتال خودرو سامانه (مسئر DTC Logic

#### DTC DETECTION LOGIC

To judge the malfunction of heated oxygen sensor 1, this diagnosis measures response time of heated oxygen sensor 1 signal. The time is compensated by engine operating (speed and load), fuel feedback control constant, and heated oxygen sensor 1 temperature index. Judgment is based on whether the compensated time (heated oxygen sensor 1 cycling time index) is inordinately long or not.



		· · · · · · · · · · · · · · · · · · ·	- PBIB2991E
DTC No.	Trouble diagnosis name	DTC detecting condition	Possible Cause
P0133	Heated oxygen sensor 1 circuit slow response	<ul> <li>The response of the voltage signal from the sensor takes more than the specified time.</li> </ul>	<ul> <li>Harness or connectors (The sensor circuit is open or short- ed.)</li> <li>Heated oxygen sensor 1</li> <li>Fuel pressure</li> <li>Fuel injector</li> <li>Intake air leaks</li> <li>Exhaust gas leaks</li> <li>PCV valve</li> <li>Mass air flow sensor</li> </ul>

# Component Function Check

**1.**PERFORM COMPONENT FUNCTION CHECK

1. Start engine and warm it up to normal operating temperature.



# EC-108

# [MR20DE]

INFOID:000000004899862

Louver

NFOID:000000000489986

Holder

INFOID:000000004899864
## P0133 HO2S1

www.digitalkhodro.com

[MR20DE]

## < COMPONENT DIAGNOSIS >

2. Check the voltage between ECM harness connector terminals.

					Α
<u> </u>	ECM				
Connector	+ .	-	Condition	Voltage	EC
	Terminal	Terminal			
F8	49 (HO2S1 signal)	56	Engine speed held at 2,000 rpm constant under no load.	• The voltage fluctuates between 0 to 0.3V and 0.6 to 1.0V more than 5 times within 10 seconds. 1 time: $0 - 0.3V \rightarrow 0.6 - 1.0V \rightarrow 0 - 0.3V$ 2 times: $0 - 0.3V \rightarrow 0.6 - 1.0V \rightarrow 0 - 0.3V \rightarrow 0.6 - 1.0V \rightarrow 0 - 0.3V$	с
YES >> IN	on result normal SPECTION EN to to <u>EC-109, "D</u>	D.	'rocedure".		D
Diagnosis F	Procedure			INFCHD:0000000489986	
1.CHECK G		CTION			F
2. Check gro <u>Is the inspection</u> YES >> Ge NO >> Re	on switch OFF. ound connection on result normal O TO 2 epair or replace N HEATED OX	<u>?</u> ground co	nnection.	spection in <u>GI-40, "Circuit Inspection"</u> .	G
				151, "Removal and Installation".	
			00 0 00		
100010010	O TO 3. HAUST GAS LI	EAK,		م ک	
	ne and run it at i an exhaust gas		e three way catalyst (ma	anifold).	J
	HC To exhaust manifold	)251 € ¢	Three way catalyst (Manifold) HO2S2	Three way catalyst (Under floor) + Muffler	K
	xhaust gas			SEC502D	М
Is exhaust gas	leak detected?	<del>_</del>			
	epair or replace. O TO 4.				N
4.CHECK FC	R INTAKE AIR	LEAK		·	
Listen for an ir	ntake air leak aft	er the ma	ss air flow sensor.		- 0
<u>Is intake air lea</u>				, i	
	epair or replace. O TO 5.				Ρ
5.CLEAR TH	E MIXTURE RA	TIO SELF	-LEARNING VALUE	<b>\$</b>	
CLEAR : S	mixture ratio se Special Repair F le for at least 10	Requireme	<u>nt"</u> .	MIXTURE RATIO SELF-LEARNING VALUE	

## P0133 HO2S1

## www.digitalkhodro.com

## < COMPONENT DIAGNOSIS >

## [MR20DE]

Is the 1st trip DTC P0171 or P172 detected? Is it difficult to start engine?

YES >> Perform trouble diagnosis for DTC P0171 or P0172. Refer to <u>EC-129. "DTC Logic"</u> or <u>EC-133.</u> "DTC Logic".

NO >> GO TO 6.

**O**.CHECK HEATED OXYGEN SENSOR 1 GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.

2. Disconnect heated oxygen sensor 1 (HO2S1) harness connector.

3. Disconnect ECM harness connector.

4. Check the continuity between HO2S1 harness connector and ECM harness connector.

. HO2	S1	EC	M	Continuity
Connector	Terminal	Connector	Terminal	
F30	1	F8	56	Existed

5. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 7.

NO >> Repair open circuit or short to ground or short to power in harness or connectors.

7.CHECK HEATED OXYGEN SENSOR 1 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

- 1. Turn ignition switch OFF.
- 2. Disconnect ECM harness connector.

3. Check the continuity between HO2S1 harness connector and ECM harness connector.

HO2	S1	EC	M	Continuity
Connector	Terminal	Connector	Terminal	
F30	4	F8	49	Existed

4. Check the continuity between HO2S1 harness connector or ECM harness connector and ground.

HO2	S1	EC	M	Ground	Continuity
Connector	Terminal	Connector	Terminal	Ciouna	Continuity
F30	4	F8	49	Ground	Not existed

5. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 8.

NO >> Repair open circuit or short to ground or short to power in harness or connectors.

## 8. CHECK MASS AIR FLOW SENSOR

Check mass air flow sensor.

Refer to EC-94, "Component Inspection".

is the inspection result normal?

YES >> GO TO 9.

NO >> Replace mass air flow sensor.

9.CHECK PCV VALVE

Refer to EC-255, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 10.

NO >> Repair or replace PCV valve.

**10.**CHECK HEATED OXYGEN SENSOR 1

Perform EC-111, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 11.

0

om

.digitalkhodi	ro.com		P0133 HO2S1	www.digitalkhodro.
< COMPONE		3 > <sup>-</sup>	F0133110231	[MR20DE]
	place heated o		sor 1.	
11.CHECK I	NTERMITTENT	INCIDEN	т	
Refer to GI-38.	, "Intermittent In	cident".		
_	SPECTION EN	D		· · · · ·
Component	Inspection			INFCID-00000004899865
1. СНЕСК НЕ		I SENSOF	3 1	
			al operating temperature mess connector termina	
	ECM			
Connector	+	-	Condition	Voltage
	Terminal	Terminal		
F8	49 (HO2S1 signal)	56	Engine speed held at 2,000 rpm constant under no load.	<ul> <li>The voltage fluctuates between 0 to 0.3V and 0.6 to 1.0V more than 5 times within 10 seconds.</li> <li>The maximum voltage is over 0.6V at least 1 time.</li> <li>The minimum voltage is below 0.3V at least 1 time.</li> <li>The voltage never exceeds 1.0V.</li> <li>1 time: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V</li> <li>2 times: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V → 0.6 - 1.0V</li> <li>→ 0 - 0.3V</li> </ul>
Is the inspection	on result normal	?		
	SPECTION EN	D		
-	O TO 2. HEATED OXYG			
				mice mice
CAUTION:	d oxygen senso			
in) onto a ha • Before insta	ard surface suc	ch as a co gen sens	oncrete floor; use a new or, clean exhaust syst	bed from a height of more than 0.5 m (19.7 w one. em threads using Oxygen Sensor Thread seize lubricant (commercial service tool).
>> IN	SPECTION EN	D		
		_		
•				:
•		-		
,				
· ,			• • • • • •	

021-62999292

÷

P0134 HO2S1

## < COMPONENT DIAGNOSIS >

P0134 HO2S1

## Description

The heated oxygen sensor 1 is placed into the exhaust manifold. It detects the amount of oxygen in the exhaust gas compared to the outside air. The heated oxygen sensor 1 has a closed-end tube made of ceramic zirconia. The zirconia generates voltage from approximately 1V in richer conditions to 0V in leaner conditions. The heated oxygen sensor 1 signal is sent to the ECM. The ECM adjusts the injection pulse duration to achieve the ideal air-fuel ratio. The ideal air-fuel ratio occurs near the radical change from 1V to 0V.





DTC Logic

## DTC DETECTION LOGIC

Under the condition in which the heated oxygen sensor 1 signal is not input, the ECM circuits will read a continuous approximately 0.3V. Therefore, for this diagnosis, the time that output voltage is within 200 to 400 mV range is monitored, and the diagnosis checks that this time is not inordinately long.



DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0134	Heated oxygen sensor 1	The voltage from the sensor is constantly approx. 0.3V.	<ul> <li>Harness or connectors</li></ul>
0134	circuit no activity detected		(The sensor circuit is open or shorted.) <li>Heated oxygen sensor 1</li>

## **Component Function Check**

## 1.PERFORM COMPONENT FUNCTION CHECK

1. Start engine and warm it up to normal operating temperature.

2. Check the voltage between ECM harness connector terminals.

021-62999292

[MR20DE]

www.digitalkhodro.com

INFOID:000000004899867

Louver

INFOID:000000000489986



INFOID:00000000489

-

P0134 HO2S1

www.digitalkhodro.com

## < COMPONENT DIAGNOSIS >

[MR20DE]

	+			Condition		Voltage	
Connector	Termin	al Term	inal				:
F8	49 (HO2S1 si	ignal) 56		e speed held at 2,00 onstant under no loa		ose not remain in the	range of 0.2 to
s the inspection						· •	
YES >> IN	SPECTIO	N END.	nia Dua	uro"			
		9, "Diagnos	sis Proceo	<u>ure</u> .			
)iagnosis F							INFOID;0000000004899
.CHECK GF		ONNECTIO	N				
. Turn igniti . Check arc	on switch ( wind conne	OFF. Action E21 #	and E38 E	Refer to Ground i	nspection in GI-	40, "Circuit Inspe	ction".
s the inspection			2110 200. 1			<u>10, 0.000, 0.000</u>	<u></u> .
	O TO 2		d connecti	ion			
	• •	blace groun		OPEN AND SHO	BT		
				) 1 harness conr	·		
. Disconned	ct ECM har	ness conne	ector.				
. Check hai	mess conti	nuity betwe	en ECM h	amess connecto	or and HO2S1 ha	arness connector	
HO	281		ECM				
Connector	Terminal	Conne	ctor T	Cont erminal	nuity		-
the inspection YES >> G	on result no O TO 3.	ormal?	ground an	56 Exit d short to power und or short to p	اولير	or connectors.	
Also chec the inspection YES >> G NO >> R CHECK HC	k harness to on result no O TO 3. epair open D2S1 INPU	for short to ormal? circuit or sl	ground an hort to grou CIRCUIT	d short to power und or short to p FOR OPEN ANI	ower in harness SHORT		
Also chec the inspection YES >> G NO >> R CHECK HC	k harness to on result no O TO 3. epair open D2S1 INPU	for short to ormal? circuit or sl	ground an hort to grou CIRCUIT	d short to power und or short to p FOR OPEN ANI	ower in harness SHORT	or connectors.	
Also chec the inspection YES >> G NO >> R CHECK HO . Check ha	k harness f on result no O TO 3. epair open D2S1 INPU mess conti	for short to ormal? circuit or sl IT SIGNAL nuity betwe	ground an hort to grou CIRCUIT een HO2S	d short to power und or short to p FOR OPEN ANI 1 harness conne	ower in harness SHORT ctor and ECM ha		•
Also chec the inspection YES >> G NO >> R CHECK HO Check han HO Connector	k harness f on result no O TO 3. epair open D2S1 INPU mess conti 2S1 Terminal	for short to ormal? circuit or sl IT SIGNAL nuity betwe Conne	ground an hort to grou CIRCUIT I een HO2S <sup>-</sup> ECM	d short to power und or short to p FOR OPEN ANI 1 harness conne erminal	ower in harness SHORT ctor and ECM ha		•
Also chec the inspection YES >> G NO >> R CHECK HO Check hat HO Connector F30	k harness f on result no O TO 3. epair open D2S1 INPU mess conti 2S1 Terminal 4	for short to ormal? circuit or sl IT SIGNAL nuity betwee Conne	ground an hort to grou CIRCUIT I een HO2S	d short to power und or short to p FOR OPEN ANI 1 harness conne erminal 49 Exi	ower in harness SHORT ctor and ECM ha	arness connector	:
Also check the inspection YES >> Gr NO >> Ro CHECK HC Check hav Connector F30 Check hav	k harness f on result no O TO 3. epair open D2S1 INPU mess conti 2S1 Terminal 4 rness conti	for short to ormal? circuit or sl IT SIGNAL nuity betwee Conne F8 nuity betwee	ground an hort to grou CIRCUIT I een HO2S ECM ECM	d short to power und or short to p FOR OPEN ANI 1 harness conne erminal 49 Exi	ower in harness SHORT ctor and ECM ha		:
Also checks the inspection YES >> Grint NO >> Ref CHECK HC Check han HO2S	k harness for result no O TO 3. epair open D2S1 INPU mess conti 2S1 Terminal 4 rness conti 1	for short to ormal? circuit or sl IT SIGNAL nuity betwee Conne F8 nuity betwee E0	ground an hort to grou CIRCUIT I een HO2S <sup>-</sup> ECM ector T een ECM h	d short to power und or short to p FOR OPEN AND 1 harness conne erminal 49 Exi harness connecte	ower in harness SHORT ctor and ECM ha	arness connector	:
Also check the inspection YES >> Gr NO >> Ro CHECK HC Check hav Connector F30 Check hav	k harness f on result no O TO 3. epair open D2S1 INPU mess conti 2S1 Terminal 4 rness conti	for short to ormal? circuit or sl IT SIGNAL nuity betwee Conne F8 nuity betwee	ground an hort to grou CIRCUIT I een HO2S ECM ECM	d short to power und or short to p FOR OPEN ANI 1 harness conne erminal 49 Exi harness connected Ground C	ower in harness SHORT ctor and ECM ha inuity sted	arness connector	:
Also checks the inspection YES >> Gring NO >> Restance CHECK HC Connector F30 Check han HO2S Connector F30	k harness for result no O TO 3. epair open D2S1 INPU mess conti 2S1 Terminal 4 rness conti 1 Terminal 4	for short to ormal? circuit or sl IT SIGNAL nuity betwee Conne EC Connector F8	ground an hort to grou CIRCUIT I een HO2S <sup>-1</sup> ECM Ector T een ECM h CM Terminal 49	d short to power und or short to p FOR OPEN ANI 1 harness conne erminal 49 Exi harness connected Ground C	ower in harness SHORT ctor and ECM ha inuity sted or or HO2S1 harn	arness connector	:
Also check the inspection YES >> Gr NO >> Re CHECK HO Check hav Connector F30 Check hav HO2S Connector F30 Also check	k harness for result no O TO 3. epair open D2S1 INPU mess conti 2S1 Terminal 4 rness conti 1 Terminal 4 k harness f	for short to ormal? circuit or sl IT SIGNAL nuity betwee Connector F8 for short to	ground an hort to grou CIRCUIT I een HO2S <sup>-1</sup> ECM Ector T een ECM h CM Terminal 49	d short to power und or short to p FOR OPEN ANI 1 harness conne erminal 49 Exi harness connected Ground C	ower in harness SHORT ctor and ECM ha inuity sted or or HO2S1 harn	arness connector	:
Also check the inspection YES >> Grint NO >> Respective CHECK HC Connector F30 Check han HO2S Connector F30 Also check Sthe inspective YES >> Grint Consector	k harness for result no O TO 3. epair open D2S1 INPU mess conti 2S1 Terminal 4 rness conti 1 Terminal 4 k harness 0 TO 4.	for short to ormal? circuit or sl IT SIGNAL nuity betwee Conne F8 nuity betwee E0 Connector F8 for short to ormal?	ground an hort to ground CIRCUIT I een HO2S <sup>-1</sup> ECM Ector T een ECM h CM Terminal 49 power.	d short to power und or short to p FOR OPEN AND harness conne erminal 49 Exi harness connector Ground O	ower in harness SHORT ctor and ECM ha inuity sted or or HO2S1 harn continuity ot existed	arness connector	:
Also check the inspection YES >> Gr NO >> Re CHECK HO Connector F30 Check hav HO2S Connector F30 Also check the inspection YES >> Gr NO >> Re	k harness to on result no O TO 3. epair open D2S1 INPU mess conti 2S1 Terminal 4 rness conti 1 Terminal 4 k harness on result no O TO 4. epair open	for short to ormal? circuit or sl IT SIGNAL nuity betwee Connector F8 for short to ormal? circuit or sl	ground an hort to grou CIRCUIT I een HO2S <sup>-</sup> ECM ector T een ECM h CM Terminal 49 power.	d short to power und or short to p FOR OPEN AND harness conne erminal 49 Exi harness connector Ground O	ower in harness SHORT ctor and ECM ha inuity sted or or HO2S1 harn	arness connector	:
Also check the inspection YES >> Gr NO >> Re CHECK HO Connector F30 Check har HO2S Connector F30 Also check Sthe inspection YES >> Gr NO >> Re CHECK HE	k harness to on result no O TO 3. epair open D2S1 INPU mess conti 2S1 Terminal 4 rness conti 1 Terminal 4 k harness on result no O TO 4. epair open EATED OX	for short to ormal? circuit or sl IT SIGNAL nuity betwee Connector F8 for short to ormal? circuit or sl YGEN SEN	ground an hort to grou CIRCUIT I een HO2S <sup>-</sup> ECM ECM Terminal 49 power.	d short to power und or short to p FOR OPEN AND harness conne erminal 49 Exi harness connector Ground O	ower in harness SHORT ctor and ECM ha inuity sted or or HO2S1 harn continuity ot existed	arness connector	:
Also check the inspection YES >> Gr NO >> Re CHECK HO Connector F30 Check hav HO2S Connector F30 Also check the inspection YES >> Gr NO >> Re	k harness to on result no O TO 3. epair open D2S1 INPU mess conti 2S1 Terminal 4 rness conti 1 Terminal 4 k harness to on result no O TO 4. epair open EATED OX 14. "Compo	for short to ormal? circuit or sl IT SIGNAL nuity betwee Connector F8 for short to ormal? circuit or sl YGEN SEN	ground an hort to grou CIRCUIT I een HO2S <sup>-</sup> ECM ECM Terminal 49 power.	d short to power und or short to p FOR OPEN AND harness conne erminal 49 Exi harness connector Ground O	ower in harness SHORT ctor and ECM ha inuity sted or or HO2S1 harn continuity ot existed	arness connector	:

P0134 HO2S1

www.digitalkhodro.com

[MR20DE]

INFOID:00000000489987

### < COMPONENT DIAGNOSIS >

## NO >> Replace heated oxygen sensor 1.

## 5. CHECK INTERMITTENT INCIDENT

Refer to GI-38, "Intermittent Incident".

### >> INSPECTION END

## Component Inspection

## **1.**CHECK HEATED OXYGEN SENSOR 1

1. Start engine and warm it up to normal operating temperature.

2. Check the voltage between ECM harness connector terminals.

	ECM				
Connector	+	-	Condition	Voltage	
Connector	Terminal	Terminal			
F8	49 (HO2S1 signal)	56	Engine speed held at 2,000 rpm constant under no load.	<ul> <li>The voltage fluctuates between 0 to 0.3V and 0.6 to 1.0V more than 5 times within 10 seconds.</li> <li>The maximum voltage is over 0.6V at least 1 time.</li> <li>The minimum voltage is below 0.3V at least 1 time.</li> <li>The voltage never exceeds 1.0V.</li> <li>1 time: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V</li> <li>2 times: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V</li> </ul>	
	o <mark>n result normal</mark> SPECTION EN	-			

NO >> GO TO 2.

## 2.REPLACE HEATED OXYGEN SENSOR 1

Replace heated oxygen sensor 1.

CAUTION:

Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.

• Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool (commercial service tool) and approved anti-seize lubricant (commercial service tool).

>> INSPECTION END

## P0135 HO2S1 HEATER

www.digitalkhodro.com

[MR20DE]

INFOID:000000004899872

INFOID:00000000489

A

EC

Е

G

н

J

1

М

Ν

0

Ρ

## < COMPONENT DIAGNOSIS > P0135 HO2S1 HEATER

## Description

## SYSTEM DESCRIPTION

Sensor	Input Signal to ECM	ECM function	Actuator	
Camshaft position sensor (PHASE) Crankshaft position sensor (POS)	Engine speed	Heated oxygen sensor 1 heater control	Heated oxygen sensor 1 heater	C
Engine coolant temperature sensor	Engine coolant temperature		i licalei	

The ECM performs ON/OFF duty control of the heated oxygen sensor 1 heater corresponding to the engine speed and engine coolant temperature. The duty percent varies with engine coolant temperature when engine is started.

## OPERATION

Engine speed	Heated oxygen sensor 1 heater	t	F
Above 3,400 rpm	OFF		Г
Below 3,400 rpm after warming up	ON		

## **DTC Logic**

## DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0135	Heated oxygen sensor 1 heater control circuit low	The current amperage in the heated oxygen sensor 1 heater circuit is out of the normal range. (An excessively low voltage signal is sent to ECM through the heated oxygen sensor 1 heater.)	<ul> <li>Harness or connectors (The heated oxygen sensor 1 heater circuit is open or shorted.)</li> <li>Heated oxygen sensor 1 heater</li> </ul>

## DTC CONFIRMATION PROCEDURE

## 1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

## TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than between 11V at idle.

## >> GO TO 2.

# 2. PERFORM DTC CONFIRMATION PROCEDURE 1. Turn ignition switch ON. 2. Wait at least 5 seconds. 3. Check 1st trip DTC. Is 1st trip DTC detected? YES >> Go to EC-115. "Diagnosis Procedure". NO >> INSPECTION END Diagnosis Procedure wfolD.composedesse74

## 1. CHECK GROUND CONNECTION

- 1. Turn ignition switch OFF.
- 2. Check ground connection E21 and E38. Refer to Ground Inspection in GI-40, "Circuit Inspection".

## Is the inspection result normal?

YES >> GO TO 2.

NO >> Repair or replace ground connection.

## 021-62999292

## P0135 HO2S1 HEATER

## www.digitalkhodro.com

[MR20DE]

< COMPONENT DIAGNOSIS >

2.CHECK HO2S1 HEATER POWER SUPPLY CIRCUIT

- 1. Disconnect heated oxygen sensor (HO2S) 1 harness connector.
- 2. Turn ignition switch ON.
- 3. Check the voltage between HO2S1 harness connector and ground.

HO	2S1	Ground	Voltage
Connector	Connector Terminal		vollage
F30	2	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 4.

NO >> GO TO 3.

**3.**DETECT MALFUNCTIONING PART

Check the following.

Harness connectors F123, E6

• 10A fuse (No. 56)

· Harness for open or short between heated oxygen sensor 1 and fuse

>> Repair or replace harness or connectors.

## **4.**CHECK HO2S1 HEATER OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

- 1. Turn ignition switch OFF.
- 2. Disconnect ECM harness connector.

3. Check the continuity between HO2S1 harness connector and ECM harness connector.

HO	2S1	E	DM	Continuiti	
Connector	nector Terminal Connector / Terminal		- Continuity		
F30	3	F7	3	Existed	

Also check harness for short to ground and short to power.

## Is the inspection result normal?

YES >> GO TO 5.

NO >> Repair open circuit or short to ground or short to power in harness or connectors.

5.CHECK HEATED OXYGEN SENSOR 1 HEATER

Refer to EC-116, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 6.

NO >> Replace heated oxygen sensor 1.

6.CHECK INTERMITTENT INCIDENT

Perform GI-38, "Intermittent Incident".

>> INSPECTION END

## Component Inspection

INFOID:000000004899875

## 1.CHECK HEATED OXYGEN SENSOR 1 HEATER

1. Turn ignition switch OFF.

2. Disconnect heated oxygen sensor (HO2S) 1 harness connector.

3. Check resistance between HO2S1 terminals as follows.

.

•

## P0135 HO2S1 HEATER

< COMPONENT DI	AGINUSIS >		[MR20DE]
Terminal	Resistance [at 25°C (77°F)]		
2 and 3	3.4 - 4.4 Ω		
1 and 2, 3, 4	∞Ω	·	
4 and 1, 2, 3	(Continuity should not exist)	1	. '
Is the inspection res YES >> INSPEC NO >> GO TO 2	TION END		
2.REPLACE HEAT	ED OXYGEN SENSOR 1		
surface such as a • Before installing	or which has been droppe concrete floor; use a new new sensor, clean exhaus	ed from a height of more than 0.5 n one. St system threads using Heated O approved anti-seize lubricant (com	xygen Sensor Thread
>> INSPEC	TION END		. <b>.</b>
			- -
DO	ىتاك خ		
بسئوليت محد	ل خودرو سامانه (ه		
: تېخەدىرەدىرايىا			
			•
			:
		· ·	
	· ·		
			!
•			
· · ·			· · ·

P0138 HO2S2

## < COMPONENT DIAGNOSIS >

## P0138 H02S2

## Description

The heated oxygen sensor 2, after three way catalyst (manifold), monitors the oxygen level in the exhaust gas on each bank.

Even if switching characteristics of the heated oxygen sensor 1 are shifted, the air-fuel ratio is controlled to stoichiometric, by the signal from the heated oxygen sensor 2.

This sensor is made of ceramic zirconia. The zirconia generates voltage from approximately 1V in richer conditions to 0V in leaner conditions.

Under normal conditions the heated oxygen sensor 2 is not used for engine control operation.

## DTC Logic



Heater pad

## DTC DETECTION LOGIC

The heated oxygen sensor 2 has a much longer switching time between rich and lean than the heated oxygen sensor 1. The oxygen storage capacity of the three way catalyst (manifold) causes the longer switching time.

To judge the malfunctions of heated oxygen sensor 2, ECM monitors whether the voltage is unusually high during the various driving condition such as fuel-cut.

1.2V 1V



DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0138	Heated oxygen sensor 2 circuit high voltage	An excessively high voltage from the sensor is sent to ECM.	<ul> <li>Harness or connectors (The sensor circuit is open or shorted)</li> <li>Heated oxygen sensor 2</li> </ul>

## DTC CONFIRMATION PROCEDURE

## 1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

## >> GO TO 2.

## 2.PERFORM DTC CONFIRMATION PROCEDURE

- 1. Start engine and warm it up to the normal operating temperature.
- 2. Turn ignition switch OFF and wait at least 10 seconds.
- 3. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
- 4. Let engine idle for 2 minutes.
- 5. Check 1st trip DTC.

### Is 1st trip DTC detected?

YES >> Go to EC-119, "Diagnosis Procedure".

NO >> INSPECTION END

```
021-62999292
```

[MR20DE]

INFOID:000000004899876

Holder

Zirconia tube

INFOID.000000048998

SEF327R

D0120 U0202

				P		252	
< COMPC		IAGNOSI	Ś >				[MR20DE]
Diagnos	is Proc	edure					INFC/ID:000000004899878
<b>1.</b> CHECK	GROUN		ECTION				
1. Turn i	gnition sv	vitch OFF.	<u> </u>		·······	·····	
	-			E38. Re	fer to Grou	nd Inspection in GI-40, "Circuit	Inspection".
•		<u>sult norma</u>	1?			•	_
	> GO TO > Repair	or replace	around co	onnectio	n.		.,
-	•	-	•		PEN AND S	SHORT	
					2 harness c		
2. Disco	nnect EC	M harness	connecto	r. 🤺			
3. Check	the cont	inuity betw	een HO2	S2 ham	ess connect	tor and ECM harness connecto	۲ <b>.</b>
HO2		E	CM	<u></u>			
Connector	Terminal	Connector	Terminal	Contin	uity	· · ·	
. E58	1	F8	59	Existe			
	-				short to po	wor	
		sult norma	-	inu anu	anon to po	WC1.	
	> GO TO						
	> GO TO						
3.DETEC		JNCTIONI	NG PART				
Check the	following						
		ors F121, E	E7				
				ated ox	ygen senso	r 2 and ECM.	
4				-		to power in hamess or connect	ors.
4.CHECK	KH02S2	INPUT SIG	GNAL CIR	CUIT F	OR OPEN A	AND SHORT	
1. Check	the cont	inuity betw	een HO2	S2 harne	ess connect	t <mark>or and EC</mark> M harness connecto	r.
				1			
HO2			M	Continu	ity .		
Connector	Terminal	Connector	Terminal		- -		
E58	4	F8	50	Existe			*
2. Check	the cont	inuity betw	een HO2	52 harne	ess connect	tor or ECM harness connector	and ground.
HOG	000	EC	-		T		
HO2 Connector	Terminal	Connector		Ground	Continuity		
E58	ierminai 4	F8	Terminal 50	Ground	Not existed		
	:			Ground	Not existed		
		ness for sh	-	ver.		· ·	•
•	> GO TO	<u>sult norma</u>					
	> GO TO						
_			NG PART				
<ul> <li>Check the</li> <li>Harness</li> </ul>			27				÷
				ated ox	ygen senso	r 2 and ECM.	ł.
							I
>	> Repair	open circu	it or short	to groui	nd or short t	to power in harness or connect	ors.
<b>6.</b> снеси	K HO2S2	CONNEC	TOR FOR	WATEF	1		

P0138 HO2S2

www.digitalkhodro.com

[MR20DE]

INFO/0:000000004899879

< COMPO	NENT	DIAGN	IOSIS	>

Check connectors for water.

## Water should not exist.

Is the inspection result normal?

YES >> GO TO 7.

NO >> Repair or replace harness or connectors.

## 7.CHECK HEATED OXYGEN SENSOR 2

Refer to EC-120, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 8.

NO >> Replace heated oxygen sensor 2.

8. CHECK INTERMITTENT INCIDENT

Refer to GI-38, "Intermittent Incident".

>> INSPECTION END

Component Inspection

1.CHECK HEATED OXYGEN SENSOR 2-1

- 1. Start engine and warm it up to the normal operating temperature.
- 2. Turn ignition switch OFF and wait at least 10 seconds.
- 3. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
- 4. Let engine idle for 1 minute.
- 5. Check the voltage between ECM harness connector terminals under the following condition.

تمحدود	ECM	سامانه	بركت ديحيتال خودروا	ù O
Connecto	+	-	Condition	. Voltage
Connecto	Terminal	Terminal	ولين ساوانه در جيتال تر	
F8 -	50 (HO2S2 signal)	59	Revving up to 4,000 rpm under no load at least 10 times	The voltage should be above 0.72V at least once during this procedure. The voltage should be below 0.46V at least once during this procedure.

Is the inspection result normal?

YES >> INSPECTION END

NO >> GO TO 2.

2.CHECK HEATED OXYGEN SENSOR 2-11

Check the voltage between ECM harness connector terminals under the following condition.

	ECM		_	Voltage	
Connector			Condition		
Connector	Terminal	Terminal			
F8	50 (HO2S2 signal)	<sup></sup> 59	Keeping engine speed at idle for 10 minutes	The voltage should be above 0.72V at least once during this procedure. The voltage should be below 0.46V at least once during this procedure.	

Is the inspection result normal?

YES >> INSPECTION END

NO >> GO TO 3.

3.CHECK HEATED OXYGEN SENSOR 2-III

Check the voltage between ECM harness connector terminals under the following condition.

## EC-120

## P0138 HO2S2

www.digitalkhodro.com

[MR20DE]

Т

## < COMPONENT DIAGNOSIS >

	ECM			· ·
Connector	+	-	Condition	Voltage
· · ·	Terminał	Terminal		
F8	50 (HO2S2 signal)	59	Coasting from 80 km/h (50 MPH) in D position (CVT), 4th gear position (M/T)	The voltage should be above 0.72V at least once during this procedure. The voltage should be below 0.46V at least once during this procedure.
s the insp	ection result n	ormal?		
	> INSPECTIO	N END		
REPLA	CE HEATED C	OXYGEN	SENSOR 2	
Replace h	eated oxygen	sensor 2.		
Discard in) onto Before	any heated o a hard surfac	e such a / oxygen	s a concrete floor; use a new o sensor, clean exhaust system	from a height of more than 0.5 m (19.7 ne. h threads using Oxygen Sensor Thread ze lubricant (commercial service tool).
>	> INSPECTIO	N END		8 !
	9-			
				μ i i i i i i i i i i i i i i i i i i i
	اران خودر			
	t			
	·			
		r.		
	I			
		·		

P0139 HO2S2

## < COMPONENT DIAGNOSIS >

## P0139 HO2S2

## Description

The heated oxygen sensor 2, after three way catalyst (manifold), monitors the oxygen level in the exhaust gas on each bank.

Even if switching characteristics of the heated oxygen sensor 1 are shifted, the air-fuel ratio is controlled to stoichiometric, by the signal from the heated oxygen sensor 2.

This sensor is made of ceramic zirconia. The zirconia generates voltage from approximately 1V in richer conditions to 0V in leaner conditions.

Under normal conditions the heated oxygen sensor 2 is not used for engine control operation.

## **DTC Logic**

### DTC DETECTION LOGIC

The heated oxygen sensor 2 has a much longer switching time between rich and lean than the heated oxygen sensor 1. The oxygen storage capacity of the three way catalyst (manifold) causes the longer switching time. To judge the malfunctions of heated oxygen sensor 2, ECM monitors whether the switching response of the sensor's voltage is faster than specified during the various driving condition such as fuel-cut.

OK

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0139	Heated oxygen sensor 2	It takes more time for the sensor to respond be-	<ul> <li>Harness or connectors</li></ul>
	circuit slow response	tween rich and lean than the specified time.	(The sensor circuit is open or shorted) <li>Heated oxygen sensor 2</li> <li>Fuel pressure</li> <li>Fuel injector</li> <li>Intake air leaks</li>

## Component Function Check

INFOID.000000004899882

## 1.PERFORM COMPONENT FUNCTION CHECK-I

- 1. Start engine and warm it up to the normal operating temperature.
- 2. Turn ignition switch OFF and wait at least 10 seconds.
- 3. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
- 4. Let engine idle for 1 minute.
- 5. Check the voltage between ECM harness connector terminals under the following condition.

ECM						
Connector	+	-	Condition	Voltage		
Connector	Terminal	Terminal		· · · · · · · · · · · · · · · · · · ·		
F8	50 (HO2S2 signal)	59	Revving up to 4,000 rpm under no load at least 10 times	A change of voltage should be more than 0.12 V for 1 second during this procedure.		

## Is the inspection result normal?

YES >> INSPECTION END

NO >> GO TO 2.



## [MR20DE]

INFOID.0000000489988

NG

< COMPONENT DIAGNOSIS >

P0139 HO2S2

www.digitalkhodro.com

[MR20DE]

### 2. PERFORM COMPONENT FUNCTION CHECK-II Δ Check the voltage between ECM harness connector terminals under the following condition. ECM EC Condition Voltage + Connector Terminal Terminal С A change of voltage should be more than 0.12 V 50 Keeping engine speed at idle for 10 F8 59 (HO2S2 signal) minutes for 1 second during this procedure. Is the inspection result normal? D YES >> INSPECTION END NO >> GO TO 3. **3.** PERFORM COMPONENT FUNCTION CHECK-III Ε Check the voltage between ECM harness connector terminals under the following condition. **ECM** Condition Voltage ÷ Connector Terminal Terminal G A change of voltage should be more than 0.12 V 50 Coasting from 80 km/h (50 MPH) in D **F8** 59 for 1 second during this procedure. (HO2S2 signal) position (CVT), 4th gear position (M/T) Is the inspection result normal? Н >> INSPECTION END YES >> Go to EC-123, "Diagnosis Procedure". NO Diagnosis Procedure INFOID:000000004899883 1.CHECK GROUND CONNECTION Turn ignition switch OFF. 1. Check ground connection E21 and E38. Refer to Ground Inspection in GI-40, "Circuit Inspection". 2. Is the inspection result normal? Κ YES >> GO TO 2. NO >> Repair or replace ground connection. 2.CLEAR THE MIXTURE RATIO SELF-LEARNING VALUE L Clear the mixture ratio self-learning value. Refer to EC-16, "MIXTURE RATIO SELF-LEARNING VALUE CLEAR : Special Repair Requirement". Run engine for at least 10 minutes at idle speed. 2. Μ Is the 1st trip DTC P0171 or P0172 detected? Is it difficult to start engine? YES >> Perform trouble diagnosis for DTC P0171 or P0172. Refer to EC-129. "DTC Logic" or EC-133. "DTC Logic". N NO >> GO TO 3. 3. CHECK HO2S2 GROUND CIRCUIT FOR OPEN AND SHORT 0 Turn ignition switch OFF. 1. 2. Disconnect heated oxygen sensor (HO2S) 2 harness connector. Disconnect ECM harness connector. 3. Check the continuity between HO2S2 harness connector and ECM harness connector. 4. P HO2S2 ECM Continuity Terminal Connector Terminal Connector E58 1 F8 59 Existed

5. Also check harness for short to ground and short to power.

Is the inspection result normal?

P0139 HO2S2

www.digitalkhodro.com

[MR20DE]

< COMPONENT DIAGNOSIS >

YES >> GO TO 5. NO >> GO TO 4.

4. DETECT MALFUNCTIONING PART

Check the following.

Harness connectors F121, E7

Harness for open or short between heated oxygen sensor 2 and ECM.

>> Repair open circuit or short to ground or short to power in harness or connectors.

## 5. CHECK HO2S2 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check the continuity between HO2S2 harness connector and ECM harness connector.

HO2	282	EC	Continuity		
Connector	Terminal	Connector	Terminal		
E58	4	- F8	50	Existed	

2. Check the continuity between HO2S2 harness connector or ECM harness connector and ground.

· HO2	282	ECM		Ground	Continuity
Connector	Terminal	Connector	Terminal	alound	Communy
E58	4	F8	50	Ground	Not existed

3. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 7. NO >> GO TO 6.

----

6.DETECT MALFUNCTIONING PART

Check the following.

Harness connectors F121, E7

Harness for open or short between heated oxygen sensor 2 and ECM.

>> Repair open circuit or short to ground or short to power in harness or connectors.

## 7. CHECK HEATED OXYGEN SENSOR 2

Refer to EC-124, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 8.

NO >> Replace heated oxygen sensor 2.

8. CHECK INTERMITTENT INCIDENT

Refer to GI-38, "Intermittent Incident".

>> INSPECTION END

**Component Inspection** 

INFOID:000000004899884

1.CHECK HEATED OXYGEN SENSOR 2-1

- 1. Start engine and warm it up to the normal operating temperature.
- 2. Turn ignition switch OFF and wait at least 10 seconds.
- 3. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
- 4. Let engine idle for 1 minute.
- 5. Check the voltage between ECM harness connector terminals under the following condition.

## P0139 HO2S2

www.digitalkhodro.com

## < COMPONENT DIAGNOSIS >

[MR20DE]

•	· ECM			
Connector	+	-	Condition	Voltage
Soumector	Terminal Terminal			:
F8	50 (HO2S2 signal)	59	Revving up to 4,000 rpm under no load at least 10 times	The voltage should be above 0.72V at least once during this procedure. The voltage should be below 0.46V at least once during this procedure.
the insp	ection result no	ormal?		· · · · · · · · · · · · · · · · · · ·
YES >	> INSPECTIOI > GO TO 2.			· · · · · · · · · · · · · · · · · · ·
CHECK	(HÉATED OX)	YGEN SE	ENSOR 2-II	
heck the	voltage betwe	en ECM	harness connector terminals unde	er the following condition.
				5
	, ECM			
	· +	-	Condition	Voltage
Connector	Terminal	Terminal		
F8	50 (HO2S2 signal)	59	Keeping engine speed at idle for 10 minutes	The voltage should be above 0.72V at least once during this procedure. The voltage should be below 0.46V at least once
				during this procedure.
NO >	> INSPECTION > GO TO 3. ( HEATED OX)	YGEN SI	10110011001101010	
NO >	> GO TO 3. ( HEATED OX) voltage betwe	YGEN SI		er the following condition.
NO >	> GO TO 3. ( HEATED OX voltage betwe ECM	YGEN SI	ENSOR 2-III harness connector terminals unde	
NO >	> GO TO 3. ( HEATED OX' voltage betwe ECM	YGEN SE en ECM	ENSOR 2-III	er the following condition.
NO >	> GO TO 3. ( HEATED OX voltage betwe ECM	YGEN SI	ENSOR 2-III harness connector terminals unde	Voltage
NO >	> GO TO 3. ( HEATED OX' voltage betwe ECM	YGEN SE en ECM	ENSOR 2-III harness connector terminals unde	
NO > CHECk heck the Connector F8	> GO TO 3. ( HEATED OX' voltage betwe ECM + Terminal 50 (HO2S2 signal)	YGEN SE en ECM Terminal 59	ENSOR 2-III harness connector terminals unde Condition Coasting from 80 km/h (50 MPH) in D	Voltage The voltage should be above 0.72V at least once during this procedure. The voltage should be below 0.46V at least once
NO > CHECk heck the Connector F8 the insp YES >	> GO TO 3. K HEATED OX voltage betwe ECM ; + Terminal 50	YGEN SE en ECM Terminal 59 ormal?	ENSOR 2-III harness connector terminals unde Condition Coasting from 80 km/h (50 MPH) in D	Voltage The voltage should be above 0.72V at least once during this procedure. The voltage should be below 0.46V at least once
NO > CHECk heck the Connector F8 the insp YES > NO >	> GO TO 3. K HEATED OX voltage betwe ECM ECM tecminal 50 (HO2S2 signal) ection result no INSPECTION	YGEN SE en ECM Terminal 59 ormal? N END	ENSOR 2-III harness connector terminals under Condition Coasting from 80 km/h (50 MPH) in D position (CVT), 4th gear position (M/T)	Voltage The voltage should be above 0.72V at least once during this procedure. The voltage should be below 0.46V at least once
NO > CHECk heck the Connector F8 the insp YES > NO > REPLA	> GO TO 3. (HEATED OX) voltage betwee ECM ECM (HO2S2 signal) ection result noise in the section is presented at the section i	YGEN SE en ECM Terminal 59 ormal? N END	ENSOR 2-III harness connector terminals under Condition Coasting from 80 km/h (50 MPH) in D position (CVT), 4th gear position (M/T) SENSOR 2	Voltage The voltage should be above 0.72V at least once during this procedure. The voltage should be below 0.46V at least once
NO > CHECk heck the Connector F8 the insp YES > NO > REPLA eplace h	<ul> <li>&gt; GO TO 3.</li> <li>K HEATED OX     <li>voltage betwee     <li>ECM</li> <li>+</li> <li>Terminal</li> <li>50         <ul> <li>(HO2S2 signal)</li> <li>ection result noise of the second second</li></ul></li></li></li></ul>	YGEN SE en ECM Terminal 59 ormal? N END	ENSOR 2-III harness connector terminals under Condition Coasting from 80 km/h (50 MPH) in D position (CVT), 4th gear position (M/T) SENSOR 2	Voltage The voltage should be above 0.72V at least once during this procedure. The voltage should be below 0.46V at least once
NO > CHECk heck the Connector F8 the insp YES > NO > REPLA eplace h AUTION	> GO TO 3. (HEATED OX) voltage betwee voltage betwee ECM ECM (HO2S2 signal) ection result noise INSPECTION > GO TO 4. CE HEATED C eated oxygen signal	YGEN SE en ECM Terminal 59 <u>ormal?</u> N END OXYGEN sensor 2.	ENSOR 2-III harness connector terminals under Condition Coasting from 80 km/h (50 MPH) in D position (CVT), 4th gear position (M/T) SENSOR 2	Voltage The voltage should be above 0.72V at least once during this procedure. The voltage should be below 0.46V at least once during this procedure.
NO > CHECk heck the Connector F8 the insp YES > NO > NO > NO > NO > NO > NO >	> GO TO 3. (HEATED OX) voltage betwee ECM ECM (HO2S2 signal) ection result noise in the second se	YGEN SE en ECM Terminal 59 <u>ormal?</u> N END OXYGEN sensor 2. <b>xygen s</b> <b>e such a</b>	ENSOR 2-III harness connector terminals under Condition Coasting from 80 km/h (50 MPH) in D position (CVT), 4th gear position (M/T) SENSOR 2 ensor which has been dropped as a concrete floor; use a new o	Voltage The voltage should be above 0.72V at least once during this procedure. The voltage should be below 0.46V at least once during this procedure.
NO > CHECK heck the Connector F8 the insp YES > NO > REPLA eplace h AUTION Discard in) onto Before i	> GO TO 3. (HEATED OX) voltage betwee ECM ECM (HO2S2 signal) ection result noise of the second se	YGEN SE en ECM Terminal 59 <u>ormal?</u> N END OXYGEN sensor 2. xygen s re such a	ENSOR 2-III harness connector terminals under Condition Coasting from 80 km/h (50 MPH) in D position (CVT), 4th gear position (M/T) SENSOR 2 ensor which has been dropped as a concrete floor; use a new o	Voltage The voltage should be above 0.72V at least once during this procedure. The voltage should be below 0.46V at least once during this procedure.
NO > CHECK heck the Connector F8 the insp YES > NO > REPLA eplace h AUTION Discard in) onto Before i	> GO TO 3. (HEATED OX) voltage betwee ECM ECM (HO2S2 signal) ection result noise of the second se	YGEN SE en ECM Terminal 59 <u>ormal?</u> N END OXYGEN sensor 2. xygen s re such a	ENSOR 2-III harness connector terminals under Condition Coasting from 80 km/h (50 MPH) in D position (CVT), 4th gear position (M/T) SENSOR 2 ensor which has been dropped as a concrete floor; use a new o	Voltage The voltage should be above 0.72V at least once during this procedure. The voltage should be below 0.46V at least once during this procedure.
NO > CHECK heck the Connector F8 the insp YES > NO > REPLA eplace h AUTION Discard in) onto Before i Cleaner	> GO TO 3. (HEATED OX) voltage betwee ECM ECM Ferminal 50 (HO2S2 signal) ection result noise any heated or a hard surfaction stalling new tool (commercised)	YGEN SE en ECM Terminal 59 Drrmal? N END DXYGEN sensor 2. xygen s re such a roxygen s	ENSOR 2-III harness connector terminals under Condition Coasting from 80 km/h (50 MPH) in D position (CVT), 4th gear position (M/T) SENSOR 2 ensor which has been dropped as a concrete floor; use a new o	Voltage The voltage should be above 0.72V at least once during this procedure. The voltage should be below 0.46V at least once during this procedure.
NO > CHECK heck the Connector F8 the insp YES > NO > REPLA eplace h AUTION Discard in) onto Before i Cleaner	> GO TO 3. (HEATED OX) voltage betwee ECM ECM (HO2S2 signal) ection result noise of the second se	YGEN SE en ECM Terminal 59 Drrmal? N END DXYGEN sensor 2. xygen s re such a roxygen s	ENSOR 2-III harness connector terminals under Condition Coasting from 80 km/h (50 MPH) in D position (CVT), 4th gear position (M/T) SENSOR 2 ensor which has been dropped as a concrete floor; use a new o	Voltage The voltage should be above 0.72V at least once during this procedure. The voltage should be below 0.46V at least once during this procedure.
NO > CHECK heck the Connector F8 the insp YES > NO > REPLA eplace h AUTION Discard in) onto Before i Cleaner	> GO TO 3. (HEATED OX) voltage betwee ECM ECM Ferminal 50 (HO2S2 signal) ection result noise any heated or a hard surfaction stalling new tool (commercised)	YGEN SE en ECM Terminal 59 Drrmal? N END DXYGEN sensor 2. xygen s re such a roxygen s	ENSOR 2-III harness connector terminals under Condition Coasting from 80 km/h (50 MPH) in D position (CVT), 4th gear position (M/T) SENSOR 2 ensor which has been dropped as a concrete floor; use a new o	Voltage The voltage should be above 0.72V at least once during this procedure. The voltage should be below 0.46V at least once during this procedure.
NO > CHECK heck the Connector F8 the insp YES > NO > REPLA eplace h AUTION Discard in) onto Before i Cleaner	> GO TO 3. (HEATED OX) voltage betwee ECM ECM Ferminal 50 (HO2S2 signal) ection result noise any heated or a hard surfaction stalling new tool (commercised)	YGEN SE en ECM Terminal 59 Drrmal? N END DXYGEN sensor 2. xygen s re such a roxygen s	ENSOR 2-III harness connector terminals under Condition Coasting from 80 km/h (50 MPH) in D position (CVT), 4th gear position (M/T) SENSOR 2 ensor which has been dropped as a concrete floor; use a new o	Voltage The voltage should be above 0.72V at least once during this procedure. The voltage should be below 0.46V at least once during this procedure.
NO > CHECK heck the Connector F8 the insp YES > NO > REPLA eplace h AUTION Discard in) onto Before i Cleaner	> GO TO 3. (HEATED OX) voltage betwee ECM ECM Ferminal 50 (HO2S2 signal) ection result noise any heated or a hard surfaction stalling new tool (commercised)	YGEN SE en ECM Terminal 59 Drrmal? N END DXYGEN sensor 2. xygen s re such a roxygen s	ENSOR 2-III harness connector terminals under Condition Coasting from 80 km/h (50 MPH) in D position (CVT), 4th gear position (M/T) SENSOR 2 ensor which has been dropped as a concrete floor; use a new o	Voltage The voltage should be above 0.72V at least once during this procedure. The voltage should be below 0.46V at least once during this procedure.
NO > CHECK heck the Connector F8 the insp YES > NO > REPLA eplace h AUTION Discard in) onto Before i Cleaner	> GO TO 3. (HEATED OX) voltage betwee ECM ECM Ferminal 50 (HO2S2 signal) ection result noise any heated or a hard surfaction stalling new tool (commercised)	YGEN SE en ECM Terminal 59 Drrmal? N END DXYGEN sensor 2. xygen s re such a roxygen s	ENSOR 2-III harness connector terminals under Condition Coasting from 80 km/h (50 MPH) in D position (CVT), 4th gear position (M/T) SENSOR 2 ensor which has been dropped as a concrete floor; use a new o	Voltage The voltage should be above 0.72V at least once during this procedure. The voltage should be below 0.46V at least once during this procedure.

## P0141 HO2S2 HEATER

www.digitalkhodro.com

## < COMPONENT DIAGNOSIS >

## P0141 HO2S2 HEATER

## Description

. INFOID:000000004899885

INFOID:000000004899

[MR20DE]

## SYSTEM DESCRIPTION

Sensor	Input signal to ECM ECM function		Actuator
Camshaft position sensor (PHASE) Crankshaft position sensor (POS)	Engine speed	Heated oxygen sensor 2	
Engine coolant temperature sensor	Engine coolant temperature	heater control	Heated oxygen sensor 2 heater
Mass air flow sensor	Amount of intake air		

The ECM performs ON/OFF control of the heated oxygen sensor 2 heater corresponding to the engine speed, amount of intake air and engine coolant temperature.

## OPERATION

Engine speed rpm	Heated oxygen sensor 2 heater		
Above 3,600	OFF		
<ul> <li>Below 3,600 rpm after the following conditions are met.</li> <li>Engine: After warming up</li> <li>Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load</li> </ul>	ON		

## DTC Logic

## DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
Ú P0141 9	Heated oxygen sensor 2 heater control circuit low	The current amperage in the heated oxygen sen- sor 2 heater circuit is out of the normal range. (An excessively low voltage signal is sent to ECM through the heated oxygen sensor 2 heater.)	<ul> <li>Harness or connectors (The heated oxygen sensor 2 heater circuit is open or shorted.)</li> <li>Heated oxygen sensor 2 heater</li> </ul>

## DTC CONFIRMATION PROCEDURE

## 1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

## TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 11V at idle.

## >> GO TO 2.

## 2.PERFORM DTC CONFIRMATION PROCEDURE

- 1. Turn ignition switch ON and wait at least 5 seconds.
- 2. Check 1st trip DTC.

## Is 1st tip DTC detected?

YES >> Go to EC-126, "Diagnosis Procedure".

NO >> INSPECTION END

## **Diagnosis** Procedure

**1.**CHECK GROUND CONNECTION

1. Turn ignition switch OFF.

2. Check ground connection E21 and E38. Refer to Ground Inspection in GI-40. "Circuit Inspection".

Is the inspection result normal?

## 021-62999292

## EC-126

## 021-62999292

(NFO/D:00000000489988)

< COMPONE	ENT DIAGNO	DSIS >				1	[MR20DI
	GO TO 2.						
-	Repair or repla	-					
<b>2.</b> CHECK H	O2S2 HEATE	ER POWER	SUPPLY CIRC	JIT	:		
1. Disconne	ect heated ox	ygen sensor	(HO2S) 2 harn	ess connecto	or.		
2. Turn igni	tion switch O	N.	<b>A</b> I		<b>- I</b>		
3. Check th	ie voltage bet	ween HO2S	2 harness conn	ector and gr	ouna.		
	252		ĺ	-			
		Ground	Voltage				
Connector	Terminal		Demonstration				
E58	2	Ground	Battery voltage	<u> </u>			· .
-	tion result nor	mal?					
	GO TO 4. GO TO 3.			Έ.			•
_			<b>-</b>				
	MALFUNCTIO		I			· · · · · ·	<u> </u>
Check the fol • 10A fuse (N							
		rt between h	leated oxygen s	ensor 2 and	fuse		i
	-F						i
>> F	Repair open c	ircuit or sho	rt to ground or s	hort to powe	r in harness	or connectors.	ŧ
			SIGNAL CIRC	-			
_							0-
	tion switch Ol ect ECM ham		or.				
			2S2 harness co	nnector and	ECM harnes	s connector.	
нс محد	02S2	ر و ساما	ECM	Continuity	ŵ		
HC Connector	02S2 Terminal	Connector	يتمال حوابا	Continuity	ŵ	0	
	deren	<u> a a g</u>	يتمال حوابا	Continuity Existed			
Connector E58	Terminal 3	Connector F7	Terminal	Existed			
Connector E58 4. Also che	Terminal 3	Connector F7 or short to gr	Terminal 5	Existed			
Connector E58 4. Also che Is the inspector YES >> 0	Terminal 3 ck harness fo tion result nor GO TO 6.	Connector F7 or short to gr	Terminal 5	Existed			
Connector E58 4. Also che Is the inspect YES >> ( NO >> (	Terminal 3 ck harness fo tion result nor GO TO 6. GO TO 5.	Connector F7 or short to gro rmal?	Terminal 5 ound and short	Existed			
Connector E58 4. Also che Is the inspect YES >> ( NO >> (	Terminal 3 ck harness fo tion result nor GO TO 6.	Connector F7 or short to gro rmal?	Terminal 5 ound and short	Existed			
Connector E58 4. Also che Is the inspect YES >> ( NO >> ( 5.DETECT Check the fo	Terminal 3 ck harness fo tion result nor GO TO 6. GO TO 5. MALFUNCTIC llowing.	Connector F7 or short to gr rmal?	Terminal 5 ound and short	Existed			
Connector E58 4. Also che Is the inspect YES >> ( NO >> ( 5.DETECT Check the fol • Harness co	Terminal 3 ck harness fo tion result nor GO TO 6. GO TO 5. MALFUNCTIO llowing. onnectors F12	Connector F7 or short to gr rmal? ONING PAR	Terminal 5 ound and short T	Existed to power.			
Connector E58 4. Also che Is the inspect YES >> ( NO >> ( 5.DETECT Check the fol • Harness co	Terminal 3 ck harness fo tion result nor GO TO 6. GO TO 5. MALFUNCTIO llowing. onnectors F12	Connector F7 or short to gr rmal? ONING PAR	Terminal 5 ound and short	Existed to power.	ECM.		
Connector E58 4. Also che Is the inspect YES >> ( NO >> ( 5.DETECT Check the fol • Harness co • Harness fo	Terminal 3 ck harness fo tion result nor GO TO 6. GO TO 5. MALFUNCTIO Ilowing. onnectors F12 r open or sho	Connector F7 or short to gr rmal? ONING PAR 21, E7 rt between h	Terminal 5 ound and short T Teated oxygen s	Existed to power.			
Connector E58 4. Also che Is the inspect YES >> ( NO >> ( 5.DETECT Check the fol • Harness co • Harness fo	Terminal 3 ck harness fo tion result nor GO TO 6. GO TO 5. MALFUNCTIO NALFUNCTIO NALFUNCTIO Ilowing. nectors F12 r open or sho	Connector F7 or short to gr rmal? ONING PAR 21, E7 rt between h sircuit or sho	Terminal 5 ound and short T neated oxygen s nt to ground or s	Existed to power.		or connectors.	
Connector E58 4. Also che Is the inspect YES >> ( NO >> ( 5.DETECT Check the fol • Harness co • Harness fo >> F 6.CHECK H	Terminal 3 ck harness fo tion result nor GO TO 6. GO TO 5. MALFUNCTIO Ilowing. Innectors F12 r open or sho Repair open c	Connector F7 or short to gr mal? ONING PAR 21, E7 rt between f sircuit or sho GEN SENSO	Terminal 5 ound and short T neated oxygen s rt to ground or s DR 2 HEATER	Existed to power.		or connectors.	
Connector E58 4. Also che Is the inspect YES >> ( NO >> ( 5.DETECT Check the fol • Harness co • Harness fo >> F 6.CHECK H Refer to <u>EC-</u>	Terminal 3 ck harness fo tion result nor GO TO 6. GO TO 5. MALFUNCTIO Ilowing. onnectors F12 r open or sho Repair open c IEATED OXY0 128, "Compor	Connector F7 or short to gr rmal? ONING PAR 21, E7 rt between f circuit or sho GEN SENSO	Terminal 5 ound and short T neated oxygen s rt to ground or s DR 2 HEATER	Existed to power.		or connectors.	
Connector E58 4. Also che Is the inspect YES >> 0 NO >> 0 5.DETECT Check the fol • Harness co • Harness fo >> F 6.CHECK H Refer to <u>EC-</u> Is the inspect	Terminal 3 ck harness fo tion result nor GO TO 6. GO TO 5. MALFUNCTIO Ilowing. Innectors F12 r open or sho Repair open c IEATED OXY 128. "Compor tion result nor	Connector F7 or short to gr rmal? ONING PAR 21, E7 rt between f circuit or sho GEN SENSO	Terminal 5 ound and short T neated oxygen s rt to ground or s DR 2 HEATER	Existed to power.		or connectors.	
Connector E58 4. Also che Is the inspect YES >> 0 5.DETECT Check the fol • Harness co • Harness fo >> F 6.CHECK H Refer to EC- Is the inspect YES >> 0	Terminal 3 ck harness fo tion result nor GO TO 6. GO TO 5. MALFUNCTIO Ilowing. Innectors F12 r open or sho Repair open c IEATED OXY 128. "Compor tion result nor GO TO 7.	Connector F7 or short to gr mal? ONING PAR 21, E7 rt between f circuit or sho GEN SENSC nent Inspect rmal?	Terminal 5 ound and short T T heated oxygen s rt to ground or s OR 2 HEATER ion".	Existed to power.		or connectors.	
Connector E58 4. Also che Is the inspect YES >> ( NO >> ( 5.DETECT Check the fol • Harness co • Harness fo >> F 6.CHECK H Refer to EC- Is the inspect YES >> ( NO >> F	Terminal 3 ck harness fo tion result nor GO TO 6. GO TO 5. MALFUNCTIO Ilowing. Innectors F12 r open or sho Repair open c IEATED OXY 128. "Compor tion result nor GO TO 7. Replace heate	Connector F7 r short to gr rmal? ONING PAR 21, E7 rt between r sircuit or sho GEN SENSC nent Inspect rmal? ed oxygen so	Terminal 5 ound and short T neated oxygen s of to ground or s OR 2 HEATER ion".	Existed to power.		or connectors.	
Connector E58 4. Also che Is the inspect YES $>> 0$ NO $>> 0$ 5.DETECT Check the fol • Harness co • Harness fo Solution • Harness fo Particular • Refer to EC- Is the inspect YES $>> 0$ NO $>> F$ 7.CHECK IN	Terminal 3 ck harness fo tion result nor GO TO 6. GO TO 5. MALFUNCTIO Ilowing. Innectors F12 r open or sho Repair open c IEATED OXYO 128. "Compor tion result nor GO TO 7. Replace heate NTERMITTEN	Connector F7 or short to gro mal? ONING PAR 21, E7 rt between f dircuit or sho GEN SENSO ment Inspect mal? ed oxygen so	Terminal 5 ound and short T neated oxygen s of to ground or s OR 2 HEATER ion".	Existed to power.		or connectors.	
Connector E58 4. Also che Is the inspect YES $>> 0$ NO $>> 0$ 5.DETECT Check the fol • Harness co • Harness fo Solution • Harness fo Particular • Refer to EC- Is the inspect YES $>> 0$ NO $>> F$ 7.CHECK IN	Terminal 3 ck harness fo tion result nor GO TO 6. GO TO 5. MALFUNCTIO Ilowing. Innectors F12 r open or sho Repair open c IEATED OXY 128. "Compor tion result nor GO TO 7. Replace heate	Connector F7 r short to gr rmal? ONING PAR 21, E7 rt between r sircuit or sho GEN SENSO nent Inspect rmal? ed oxygen so	Terminal 5 ound and short T neated oxygen s of to ground or s OR 2 HEATER ion".	Existed to power.		or connectors.	
Connector E58 4. Also che Is the inspect YES $>> 0$ NO $>> 0$ 5. DETECT Check the fol • Harness co • Harness fo Solution • Harness fo • Harness fo Solution • Harness fo • Harness fo • Harness fo • Harness fo Solution • Harness fo • Harness fo • Harness fo • Harness fo • CHECK H Refer to EC- Is the inspect YES $>> 0$ NO $>> 16$ 7. CHECK IN Refer to GI-3	Terminal 3 ck harness fo tion result nor GO TO 6. GO TO 5. MALFUNCTION Iowing. Innectors F12 r open or sho Repair open c IEATED OXYO 128, "Compor tion result nor GO TO 7. Replace heate NTERMITTEN 18, "Intermitten	Connector F7 or short to grown mal? ONING PAR 21, E7 rt between f sircuit or sho GEN SENSC ment Inspect mal? ed oxygen so NT INCIDEN nt Incident".	Terminal 5 ound and short T neated oxygen s of to ground or s OR 2 HEATER ion".	Existed to power.		or connectors.	
Connector E58 4. Also che Is the inspect YES $>> 0$ NO $>> 0$ 5. DETECT Check the fol • Harness co • Harness fo Solution • Harness fo • Harness fo Solution • Harness fo • Harness fo • Harness fo • Harness fo Solution • Harness fo • Harness fo • Harness fo • Harness fo • CHECK H Refer to EC- Is the inspect YES $>> 0$ NO $>> 16$ 7. CHECK IN Refer to GI-3	Terminal 3 ck harness fo tion result nor GO TO 6. GO TO 5. MALFUNCTIO Ilowing. Innectors F12 r open or sho Repair open c IEATED OXYO 128. "Compor tion result nor GO TO 7. Replace heate NTERMITTEN	Connector F7 or short to grown mal? ONING PAR 21, E7 rt between f sircuit or sho GEN SENSC ment Inspect mal? ed oxygen so NT INCIDEN nt Incident".	Terminal 5 ound and short T neated oxygen s of to ground or s OR 2 HEATER ion".	Existed to power.		or connectors.	
Connector E58 4. Also che Is the inspect YES $>> 0$ NO $>> 0$ 5. DETECT Check the fol • Harness co • Harness fo Solution • Harness fo • Harness fo Solution • Harness fo • Harness fo • Harness fo • Harness fo Solution • Harness fo • Harness fo • Harness fo • Harness fo • CHECK H Refer to EC- Is the inspect YES $>> 0$ NO $>> 16$ 7. CHECK IN Refer to GI-3	Terminal 3 ck harness fo tion result nor GO TO 6. GO TO 5. MALFUNCTION Iowing. Innectors F12 r open or sho Repair open c IEATED OXYO 128, "Compor tion result nor GO TO 7. Replace heate NTERMITTEN 18, "Intermitten	Connector F7 or short to grown mal? ONING PAR 21, E7 rt between f sircuit or sho GEN SENSC ment Inspect mal? ed oxygen so NT INCIDEN nt Incident".	Terminal 5 ound and short T neated oxygen s of to ground or s OR 2 HEATER ion".	Existed to power.		or connectors.	

## P0141 HO2S2 HEATER

## < COMPONENT DIAGNOSIS >

## **Component Inspection**

[MR20DE]

www.digitalkhodro.com

INFOID:000000004899888

## 1. CHECK HEATED OXYGEN SENSOR 2 HEATER

- 1. Turn ignition switch OFF.
- 2. Disconnect heated oxygen sensor 2 harness connector.
- 3. Check resistance between heated oxygen sensor 2 terminals as follows.

Terminals	Resistance [at 25°C (77°F)
2 and 3	3.4 - 4.4 Ω
1 and 2, 3, 4	Ω ∞
4 and 1, 2, 3	(Continuity should not exist)

Is the inspection result normal?

YES >> INSPECTION END

NO >> GO TO 2.

## 2. REPLACE HEATED OXYGEN SENSOR 2

Replace heated oxygen sensor 2. CAUTION:

- Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.
- Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool (commercial service tool) and approved anti-seize lubricant (commercial service tool).

>> INSPECTION END

شرکت دیجیتال خودرو سامانه (مسئولیت محدود)

## اولین سامانه دیجیتال تعمیر کاران خودرو در ایران

021-62999292

## www.digitalkhodro.com **P0171 FUEL INJECTION SYSTEM FUNCTION**

## < COMPONENT DIAGNOSIS >

## P0171 FUEL INJECTION SYSTEM FUNCTION

## DTC Logic

## DTC DETECTION LOGIC

With the Air/Fuel Mixture Ratio Self-Learning Control, the actual mixture ratio can be brought closely to the theoretical mixture ratio based on the mixture ratio feedback signal from the heated oxygen sensors 1. The ECM calculates the necessary compensation to correct the offset between the actual and the theoretical ratios.

In case the amount of the compensation value is extremely large (The actual mixture ratio is too lean.), the ECM judges the condition as the fuel injection system malfunction and lights up the MIL (2 trip detection logic).

Sensor	Input signal to ECM	ECM function	Actuator	
Heated oxygen sensor 1	Density of oxygen in exhaust gas (Mixture ratio feedback signal)	Fuel injection control	Fuel injector	

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause	
P0171	Fuel injection system too lean	<ul> <li>Fuel injection system does not operate properly.</li> <li>The amount of mixture ratio compensation is too large. (The mixture ratio is too lean.)</li> </ul>	Intake air leaks     Heated oxygen sensor 1     Fuel injector     Exhaust gas leaks     Incorrect fuel pressure     Lack of fuel     Mass air flow sensor	· ·

## **DTC CONFIRMATION PROCEDURE**

## **1.**PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

## >> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE-I

1. Clear the mixture ratio self-learning value. Refer to EC-16, "MIXTURE RATIO SELF-LEARNING VALUE CLEAR : Special Repair Requirement".	i i
2. Start engine.	L,
Is it difficult to start engine?	
YES >> GO TO 3. NO >> GO TO 4.	M
3.RESTART ENGINE	
If it is difficult to start engine, the fuel injection system has a malfunction, too. Crank engine while depressing accelerator pedal.	N,
Does engine_start?	·i
YES >> Go to <u>EC-130, "Diagnosis Procedure"</u> . NO >> Check exhaust and intake air leak visually.	0
4. PERFORM DTC CONFIRMATION PROCEDURE-II	j. T
<ol> <li>Start engine and let it idle for at least 10 minutes.</li> <li>Check 1st trip DTC.</li> </ol>	P
Is 1st trip DTC detected?	•
YES >> Go to EC-130, "Diagnosis Procedure".	5
NO >> GO TO 5.	ł
5. PERFORM DTC CONFIRMATION PROCEDURE-III	
1. Turn ignition switch OFF and wait at least 10 seconds.	4

## 021-62999292

## 021-629992

## [MR20DE]

INFQID:00000004899889

## EC

C

D

E

.1

κ

А

## www.digitalkhodro.com P0171 FUEL INJECTION SYSTEM FUNCTION

## < COMPONENT DIAGNOSIS >

## [MR20DE]

INFOID:00000004899890

 Start engine and drive the vehicle under the similar conditions to Freeze Frame Data for 10 minutes. Refer to the table below.

## Hold the accelerator pedal as steady as possible.

The similar conditions to (1st trip) Freeze Frame Data means the vehicle operation that the following conditions should be satisfied at the same time.

Engine speed	Engine speed in the freeze frame data $\pm$ 400 rpm
Vehicle speed	Vehicle speed in the freeze frame data $\pm$ 10 km/h (6 MPH)
	When the freeze frame data shows lower than 70 °C (158 °F), T should be lower than 70 °C (158 °F).
Engine coolant temperature (T) condition	When the freeze frame data shows higher than or equal to 70 °C (158 °F), T should be higher than or equal to 70 °C (158 °F).

## CAUTION:

## Always drive at a safe speed.

3. Check 1st trip DTC.

## Is 1st trip DTC detected?

- YES >> Go to EC-130, "Diagnosis Procedure".
- NO >> INSPECTION END

## Diagnosis Procedure

## **1.**CHECK EXHAUST GAS LEAK

Start engine and run it at idle.
 Listen for an exhaust gas leak before three way catalyst (manifold).



## YES >> Repair or replace.

NO >> GO TO 2.

## 2. CHECK FOR INTAKE AIR LEAK

- 1. Listen for an intake air leak after the mass air flow sensor.
- 2. Check PCV hose connection.

## Intake air leak detected?

- YES >> Repair or replace.
- NO >> GO TO 3.

## **3.**CHECK HEATED OXYGEN SENSOR 1 INPUT SIGNAL CIRCUIT

- 1. Turn ignition switch OFF.
- 2. Disconnect heated oxygen sensor (HO2S) 1 harness connector.
- 3. Disconnect ECM harness connector.
- 4. Check the continuity between HO2S1 harness connector and ECM harness connector.

HO2	2S1	EC	Continuity	
Connector Terminal		Connector	Terminal	Communy
F30 4		F8	49	Existed

5. Check the continuity between HO2S1 harness connector or ECM harness connector and ground.

## **P0171 FUEL INJECTION SYSTEM FUNCTION**

## < COMPONENT DIAGNOSIS >

www.digitalkhodro.com

[MR20DE]

				·	<del></del>
HO2		EC		Ground	Continuity
Connector	Terminal	Connector	Terminal		
F30	4	F8	49	Ground	Not existed
		ess for sho	-	er.	, <b>–</b>
		<u>ult normal?</u>			
	GO TO 4 Benair o		or short t	o aroun	d or short to power in harness or connectors.
•	•	ESSURE		o groun	
			ro Dofor	to EC 2	287, "Inspection".
					ressure. Refer to <u>EC-287, "Inspection"</u> .
	:			-	
At i	dling: Ap	proximate	ely 350 kF	Pa (3.5 b	bar, 3.57 kg/cm <sup>2</sup> , 51 psi)
the inspe	ection resu	ult normal?			
	GO TO G	-			
	GO TO S				
		DSES AND			
		d fuel tube:	-	ging.	
		<u>ult normal?</u> " <mark>fuel filter</mark> :			réombly <sup>n</sup>
	Replace			ump as	sembly .
.CHECK	MASS A	R FLOW S	ENSOR		
) With GS	<u></u>				
	all remove	ed parts.			
					e \$01 with GST.
•		value withi			Plow Sensor".
	GO TO 7		n the spe	cincatio	
	> Check c	onnectors			als or loose connections in the mass air flow sensor circuit or
,	-	. Refer to <u>E</u>		-	<u>ic"</u> .
.CHECK	FUNCTIO		EL INJEC	TOR	
	gine idle.				
Listen	to each tu	iel injector	operating	souna.	
Clic	king noi:	se should	be heard	I	
the inspe	ection resu	uit normal?			At idle
	- GO TO 8				100l
<< 0V					INJECTOR, refer to Click
	<u>CC-244.</u>	"Compone		<u>on onec</u>	
					Click
					Click - The PBIB3332E
.CHECK	FUEL IN	JECTOR			
	nition swi				
					there are no fire hazards near the vehicle.
		arness con e assembl			cted. 57. "Removal and Installation".
Keep f	uel hose a	and all fuel	injectors	connect	ted to fuel tube.
The fu	el injector	harness co	onnectors	should	remain connected.

- Disconnect all ignition coil harness connectors.
   Prepare pans or saucers under each fuel injector.

EC-131

## www.digitalkhodro.com

## www.digitalkhodro.com P0171 FUEL INJECTION SYSTEM FUNCTION

## < COMPONENT DIAGNOSIS >

## [MR20DE]

7. Crank engine for about 3 seconds.

## Fuel should be sprayed evenly for each fuel injector.

## Is the inspection result normal?

- YES >> GO TO 9.
- NO >> Replace fuel injectors from which fuel does not spray out. Always replace O-ring with new ones.



## 9. CHECK INTERMITTENT INCIDENT

Refer to GI-38, "Intermittent Incident".

>> INSPECTION END

# حيجيتال خودره

شرکت دیجیتال خودرو سامانه (مسئولیت محدود)

## اولین سامانه دیجیتال تعمیرکاران خودرو در ایران

.

. .

021-62999292

EC-132

## P0172 FUEL INJECTION SYSTEM FUNCTION

< COMPONENT DIAGNOSIS >

## P0172 FUEL INJECTION SYSTEM FUNCTION

## DTC Logic

DTC DETECTION LOGIC

With the Air/Fuel Mixture Ratio Self-Learning Control, the actual mixture ratio can be brought closely to the theoretical mixture ratio based on the mixture ratio feedback signal from the heated oxygen sensors 1. The ECM calculates the necessary compensation to correct the offset between the actual and the theoretical ratios.

In case the amount of the compensation value is extremely large (The actual mixture ratio is too rich.), the ECM judges the condition as the fuel injection system malfunction and lights up the MIL (2 trip detection logic).

Sensor	Input signal to ECM	ECM function	Actuator
Heated oxygen sensor 1	Density of oxygen in exhaust gas (Mixture ratio feedback signal)	Fuel injection control	Fuel injector

•	DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause	F
•	P0172	Fuel injection system too rich	<ul> <li>Fuel injection system does not operate properly.</li> <li>The amount of mixture ratio compensation is too large. (The mixture ratio is too rich.)</li> </ul>	<ul> <li>Heated oxygen sensor 1</li> <li>Fuel injector</li> <li>Exhaust gas leaks</li> <li>Incorrect fuel pressure</li> <li>Mass air flow sensor</li> </ul>	G

## DTC CONFIRMATION PROCEDURE

## 1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

## >> GO TO 2.

## 2.PERFORM DTC CONFIRMATION PROCEDURE-I

	earning value. Refer to EC-16. "MIXTURE RATIO SELF-LEAR	NING VALUI
<u>CLEAR : Special Repair Rep</u> 2. Start engine.	<u>luirement"</u> .	ŀ
Is it difficult to start engine?		
YES >> GO TO 3.		
NO >> GO TO 4.		. 1
3.RESTART ENGINE		
If it is difficult to start engine, the	fuel injection system has a malfunction, too.	•
Crank engine while depressing a	ccelerator pedal.	I.
<u>Does engine start?</u>		
YES >> Go to EC-134, "Diag		
	and check for fouling, etc.	
4.PERFORM DTC CONFIRMAT	TION PROCEDURE-II	
1. Start engine and let it idle for	r at least 10 minutes.	
2. Check 1st trip DTC.		
Is 1st trip DTC detected?		Đ
YES >> Go to <u>EC-134, "Diag</u> NO >> GO TO 5.	inosis Procedure".	
5. PERFORM DTC CONFIRMA		
·		
<ol> <li>Turn ignition switch OFF and</li> <li>Start engine and drive the version</li> </ol>	d wait at least 10 seconds. shicle under the similar conditions to (1st trip) Freeze Frame Da	ta for 10 mir
utes. Refer to the table below		
Hold the accelerator pedal		
62999292	EC-133	021-629

## [MR20DE]

INFOID:000000004899891

А

EC

C

D

Е

Н

## P0172 FUEL INJECTION SYSTEM FUNCTION

## < COMPONENT DIAGNOSIS >

[MR20DE]

INFOID 000000004899892

The similar conditions to Freeze Frame Data means the vehicle operation that the following conditions should be satisfied at the same time.

Engine speed	Engine speed in the freeze frame data ± 400 rpm		
Vehicle speed	Vehicle speed in the freeze frame data $\pm$ 10 km/h (6 MPH)		
Engine coolant temperature (T) condition	When the freeze frame data shows lower than 70 °C (158 °F), T should be lower than 70 °C (158 °F).		
	When the freeze frame data shows higher than or equal to 70 °C (158 °F), T should be higher than or equal to 70 °C (158 °F).		

## CAUTION:

## Always drive at a safe speed.

3. Check 1st trip DTC.

## Is 1st trip DTC detected?

YES >> Go to <u>EC-134</u>, "Diagnosis Procedure". NO >> INSPECTION END

## Disenseis Breedure

Diagnosis Procedure

## **1.**CHECK EXHAUST GAS LEAK

- 1. Start engine and run it at idle.
- 2. Listen for an exhaust gas leak before three way catalyst (manifold).



## Listen for an intake air leak after the mass air flow sensor.

Is intake air leak detected?

- YES >> Repair or replace.
- NO >> GO TO 3.

## **3.**CHECK HEATED OXYGEN SENSOR 1 INPUT SIGNAL CIRCUIT

- 1. Turn ignition switch OFF.
- 2. Disconnect heated oxygen sensor (HO2S) 1 harness connector.
- 3. Disconnect ECM harness connector.
- 4. Check the continuity between HO2S1 harness connector and ECM harness connector.

HO2S1 sensor 1		ECM		Continuity
Connector	Terminal	Connector Terminal		Continuity
F30	4	F8	49	Existed

5. Check the continuity between HO2S1 harness connector or ECM harness connector and ground.

HO2S1 sensor 1		ECM		Ground	Continuity
Connector	Terminal	Connector Terminal			Continuity
F30	4	FB	49	Ground	Not existed

## EC-134

www.digitalkhodro.com P0172 FUEL INJECTION SYSTEM FUNCTION	www.digitalkhodro.co
< COMPONENT DIAGNOSIS >	[MR20DE]
6. Also check harness for short to power.	
Is the inspection result normal?	. Α
YES >> GO TO 4.	
NO >> Repair open circuit or short to ground or short to power in harness or conne	ECTORS.
4.CHECK FUEL PRESSURE	!
<ol> <li>Release fuel pressure to zero. Refer to <u>EC-287. "Inspection"</u>.</li> <li>Install fuel pressure gauge and check fuel pressure. Refer to <u>EC-287. "Inspection"</u>.</li> </ol>	c
At idling: Approximately 350 kPa (3.5 bar, 3.57 kg/cm <sup>2</sup> , 51 psi)	ι.
Is the inspection result normal?	D
YES >> GO TO 6.	. : I
NO >> GO TO 5.	her.
5. CHECK FUEL HOSES AND FUEL TUBES	E
Check fuel hoses and fuel tubes for clogging.	· · · ·
Is the inspection result normal?	· F
YES >> Replace "fuel filter and fuel pump assembly". NO >> Repair or replace	1
6. CHECK MASS AIR FLOW SENSOR	
	G
With GST     Install all removed parts.	
2. Check mass air flow sensor signal in "Service \$01" with GST.	Н
For specification, refer to EC-290. "Mass Air Flow Sensor".	
Is the measurement value within the specification?	
YES >> GO TO 7. NO >> Check connectors for rusted terminals or loose connections in the mass ai	r flow sensor circuit or
grounds. Refer to <u>EC-92, "DTC Logic"</u> .	
7.CHECK FUNCTION OF FUEL INJECTOR	J
1. Let engine idle.	
2. Listen to each fuel injector operating sound.	K
Clicking noise should be heard.	
Is the inspection result normal?	Suitable
YES >> GO TO 8.	/tool L
NO >> Perform trouble diagnosis for FUEL INJECTOR, refer to click	
EC-244, "Component Function Check".	
Clic	
Click	
	N
1. Remove fuel injector assembly. Refer to EM-157. "Removal and Installation".	
Keep fuel hose and all fuel injectors connected to fuel tube.	: C
2. Confirm that the engine is cooled down and there are no fire hazards near the vehic	cle.
<ol> <li>Disconnect all fuel injector harness connectors.</li> <li>Disconnect all ignition coil harness connectors.</li> </ol>	
5. Prepare pans or saucers under each fuel injectors.	, P
6. Crank engine for about 3 seconds.	ł
Make sure fuel does not drip from fuel injector.	, : !
Is the inspection result normal? YES >> GO TO 9.	1
NO >> Replace the fuel injectors from which fuel is dripping. Always replace O-ring	g with new one.
9. CHECK INTERMITTENT INCIDENT	

## www.digitalkhodro.com P0172 FUEL INJECTION SYSTEM FUNCTION www.digitalkhodro.com

## < COMPONENT DIAGNOSIS >

Refer to GI-38. "Intermittent Incident".

>> INSPECTION END

021-62999292



## [MR20DE]

## P0222, P0223 TP SENSOR

< COMPONENT DIAGNOSIS >

P0222, P0223 TP SENSOR

## Description

Electric throttle control actuator consists of throttle control motor, throttle position sensor, etc. The throttle position sensor responds to the throttle valve movement.

The throttle position sensor has two sensors. These sensors are a kind of potentiometers which transform the throttle valve position into output voltage, and emit the voltage signal to the ECM. In addition, these sensors detect the opening and closing speed of the throttle valve and feed the voltage signals to the ECM. The ECM judges the current opening angle of the throttle valve from these signals and the ECM controls the throttle control motor to make the throttle valve opening angle properly in response to driving condition.

## DTC Logic

## DTC DETECTION LOGIC

### NOTE:

If DTC P0222 or P0223 is displayed with DTC P1229, first perform the trouble diagnosis for DTC P1229. Refer to EC-202. "DTC Logic".

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0222	Throttle position sensor 1'circuit low input	An excessively low voltage from the TP sensor 1 is sent to ECM.	Harness or connectors     (TP sensor 1 circuit is open or shorted.)
P0223	Throttle position sensor 1 circuit high input	An excessively high voltage from the TP sensor 1 is sent to ECM.	Electric throttle control actuator (TP sensor 1)

## DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

## **TESTING CONDITION:**

Before performing the following procedure, confirm that battery voltage is more than 10V at idle.

>> GO TO 2.

### 2. PERFORM DTC CONFIRMATION PROCEDURE Start engine and let it idle for 1 second. 1.

Check DTC. 2.

Is DTC detected?

YES >> Go to EC-137, "Diagnosis Procedure".

NO >> INSPECTION END

## **Diagnosis** Procedure

## 1. CHECK GROUND CONNECTION

- 1. Turn ignition switch OFF.
- Check ground connection E21 and E38. Refer to Ground Inspection in GI-40, "Circuit Inspection". 2. Is the inspection result normal?
- YES >> GO TO 2.
- NO >> Repair or replace ground connection.

 ${f 2.}$  CHECK THROTTLE POSITION SENSOR 1 POWER SUPPLY CIRCUIT

1. Disconnect electric throttle control actuator harness connector.

2. Turn ignition switch ON.



[MR20DE]

INFOID-00000000489989:

Throttle position sensor

Sensor 1

Sensor 2

45

Throttle valve opening angle (deg)

90

6.0

4.0

Throttle position output voltage

sensor

tion



EC

C

D

F

F

G

Н

K

Ł

Μ

N

Ο

135

PBIB0145E

INFOID-00000000489989-



INFO/D-00000000489989

## P0222, P0223 TP SENSOR

## www.digitalkhodro.com

< COMPONENT DIAGNOSIS >

[MR20DE]

021-62999292

3. Check the voltage between electric throttle control actuator harness connector and ground.

Electric throttle c	Ground	Voltage		
Connector	Terminal	Giodila	VUILaye	
F29	1	Ground	Approx. 5V	

is the inspection result normal?

YES >> GO TO 3.

NO >> Repair open circuit or short to ground or short to power in harness or connectors.

 ${f 3}.$ CHECK THROTTLE POSITION SENSOR 1 GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.

- 2. Disconnect ECM harness connector.
- 3. Check the continuity between electric throttle control actuator harness connector and ECM harness connector.

Electric throttle control actuator		ECM		Continuity
Connector	Terminal	Connector	Terminal	Continuity
F29	4	F8	36	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 4.

NO >> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK THROTTLE POSITION SENSOR 1 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check the continuity between electric throttle control actuator harness connector and ECM harness connector.

Electric throttle control actuator		EC	Continuity	
Connector	Terminal	Connector	Terminal	Continuity
F29	2	F8	33	Existed

2. Also check harness for short to ground and short to power.

is the inspection result normal?

YES >> GO TO 5.

NO >> Repair open circuit or short to ground or short to power in harness or connectors.

**5.**CHECK THROTTLE POSITION SENSOR

Refer to EC-104, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 7.

NO >> GO TO 6.

**6.**REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

1. Replace electric throttle control actuator.

2. Go to EC-104. "Special Repair Requirement".

>> INSPECTION END

7. CHECK INTERMITTENT INCIDENT

Refer to GI-38. "Intermittent Incident".

>> INSPECTION END

## P0222, P0223 TP SENSOR

www.digitalkhodro.com

ſM	R20	DEI
	· +	

INFOID:0000000048

## < COMPONENT DIAGNOSIS >

**Component Inspection** 

А

EC

С

D

Ε

F

G

Н

К

М

M

0

p

ŧ

NFOID:000000004

## 1. CHECK THROTTLE POSITION SENSOR

- Turn ignition switch OFF. 1.
- 2. Reconnect all harness connectors disconnected.
- Perform EC-15. "THROTTLE VALVE CLOSED POSITION LEARNING : Special Repair Requirement". 3.
- 4. Turn ignition switch ON.
- 5. Set shift lever to D (CVT) or 1st (M/T) position.
- Check the voltage between ECM harness connector terminals. 6.

	ECM		•	
Connector	+		Condition	Voltage
	Terminal Termina			
F8	, 33 (TP sensor 1 signal)	36	Accelerator pedal: Fully released	More than 0.36V
			Accelerator pedal: Fully depressed	Less than 4.75V
	34 (TP sensor 2 signal)		Accelerator pedal: Fully released	Less than 4.75V
			Accelerator pedal: Fully depressed	More than 0.36V

Is the inspection result normal?

YES >> INSPECTION END

NO >> GO TO 2.

2. REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

1. Replace electric throttle control actuator.

2. Go to EC-139, "Special Repair Requirement".

## >> INSPECTION END

Special Repair Requirement

## 1.PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Refer to EC-15, "THROTTLE VALVE CLOSED POSITION LEARNING : Special Repair Requirement"

## >> GO TO 2.

2. PERFORM IDLE AIR VOLUME LEARNING

Refer to EC-15, "IDLE AIR VOLUME LEARNING : Special Repair Requirement"

>> END

## P0300, P0301, P0302, P0303, P0304 MISFIRE

< COMPONENT DIAGNOSIS >

## [MR20DE]

www.digitalkhodro.com

## P0300, P0301, P0302, P0303, P0304 MISFIRE

## DTC Logic

INFOID:000000004899898

## DTC DETECTION LOGIC

When a misfire occurs, engine speed will fluctuate. If the engine speed fluctuates enough to cause the crankshaft position (CKP) sensor (POS) signal to vary, ECM can determine that a misfire is occurring.

Sensor	Input signal to ECM	ECM function
Crankshaft position sensor (POS)	Engine speed	On board diagnosis of misfire

The misfire detection logic consists of the following two conditions.

1. One Trip Detection Logic (Three Way Catalyst Damage)

On the 1st trip, when a misfire condition occurs that can damage the three way catalyst (TWC) due to overheating, the MIL will blink.

When a misfire condition occurs, the ECM monitors the CKP sensor signal every 200 engine revolutions for a change.

When the misfire condition decreases to a level that will not damage the TWC, the MIL will turn off. If another misfire condition occurs that can damage the TWC on a second trip, the MIL will blink. When the misfire condition decreases to a level that will not damage the TWC, the MIL will remain on. If another misfire condition occurs that can damage the TWC, the MIL will begin to blink again.

### 2. Two Trip Detection Logic (Exhaust quality deterioration) For misfire conditions that will not damage the TWC (but will affect vehicle emissions), the MIL will only light when the misfire is detected on a second trip. During this condition, the ECM monitors the CKP sensor signal every 1,000 engine revolutions.

A misfire malfunction can be detected on any one cylinder or on multiple cylinders.

DTC No	Trouble diagnosis name	DTC detecting condition	Possible cause	
P0300	Multiple cylinder misfire detected	Multiple cylinder misfire.	Improper spark plug	
P0301	No. 1 cylinder misfire detected	No. 1 cylinder misfires.	<ul> <li>Insufficient compression</li> <li>Incorrect fuel pressure</li> <li>The fuel injector circuit is open or shorted</li> <li>Fuel injector</li> <li>Intake air leak</li> <li>The ignition signal circuit is open or shorted</li> <li>Lack of fuel</li> <li>Signal plate</li> <li>Heated oxygen sensor 1</li> <li>Incorrect PCV hose connection</li> </ul>	
P0302	No. 2 cylinder misfire detected	No. 2 cylinder misfires.		
P0303	No. 3 cylinder misfire detected	No. 3 cylinder misfires.		
P0304	No. 4 cylinder misfire detected	No. 4 cylinder misfires.		

## DTC CONFIRMATION PROCEDURE

## 1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

## >> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE-I

- 1. Start engine and warm it up to normal operating temperature.
- 2. Turn ignition switch OFF and wait at least 10 seconds.
- 3. Restart engine and let it idle for about 15 minutes.

4. Check 1st trip DTC.

## Is 1st trip DTC detected?

- YES >> Go to EC-141, "Diagnosis Procedure".
- NO >> GO TO 3.

**3.**PERFORM DTC CONFIRMATION PROCEDURE-II

1. Turn ignition switch OFF and wait at least 10 seconds.

## www.digitalkhodro.com

## P0300, P0301, P0302, P0303, P0304 MISFIRE www.digitalkhodro.com

## < COMPONENT DIAGNOSIS >

2. Start engine and drive the vehicle under the similar conditions to Freeze Frame Data for a certain time. Refer to the table below.

## Hold the accelerator pedal as steady as possible.

The similar conditions to Freeze Frame Data means the vehicle operation that the following conditions should be satisfied at the same time.

## CAUTION:

Always drive vehicle in safe manner according to traffic conditions and obey all traffic laws when driving.

Engine speed	Engine speed in the freeze frame data ± 400 rpm	
Vehicle speed Vehicle speed in the freeze frame data ± 10 km/h (6 MPH)		n
Engine coolant temperature (T)	When the freeze frame data shows lower than 70 °C (158 °F), T should be lower than 70 °C (158 °F).	U
condition	When the freeze frame data shows higher than or equal to 70 °C (158 °F), T should be higher than or equal to 70 °C (158 °F).	Ε

The time to driving varies according to the engine speed in the freeze frame data.

Engine speed	Time	
Around 1,000 mm	Approximately 10 minutes	
Around 2,000 mm	Approximately 5 minutes	
More than 3,000 rpm	Approximately 3.5 minutes	,
3. Check 1st trip DTC.		
Is 1st trip DTC detected	2	
	41, "Diagnosis Procedure".	
NO >> INSPECTIO	IN END	
<b>Diagnosis</b> Procedu	شرکت دیجیتال خودر و ساما <b>re</b>	INFOID:000000048998

## CHECK FOR INTAKE AIR LEAK AND PCV HOSE

- 1. Start engine and run it at idle speed.
- 2. Listen for the sound of the intake air leak.
- 3. Check PCV hose connection.

## Is intake air leak detected?

- YES >> Discover air leak location and repair.
- NO >> GO TO 2.

## ${f 2}$ . CHECK FOR EXHAUST SYSTEM CLOGGING

Stop engine and visually check exhaust tube, three way catalyst and muffler for dents. Is the inspection result normal?

- YES >> GO TO 3.
- NO >> Repair or replace it.

## $\mathbf{3}.$ CHECK FUNCTION OF FUEL INJECTOR

- 1. Start engine and let engine idle.
- 2. Listen to each fuel injector operating sound.

## Clicking noise should be heard.

Is the inspection result normal?

- YES >> GO TO 4.
- NO >> Perform trouble diagnosis for FUEL INJECTOR, refer to EC-245, "Component Inspection".



021-62999292

[MR20DE]

А

EC

С

F

G

Н

J

Κ

L

M

Ν

www.digitalkhodro.com P0300, P0301, P0302, P0303, P0304 MISFIRE

< COMPONENT DIAGNOSIS >

[MR20DE]

4. CHECK FUNCTION OF IGNITION COIL-I

## CAUTION:

## Do the following procedure in the place where ventilation is good without the combustible.

- Turn ignition switch OFF. 1.
- Remove fuel pump fuse in IPDM E/R to release fuel pressure. 2.
- 3. Start engine.
- 4. After engine stalls, crank it two or three times to release all fuel pressure.
- 5. Turn ignition switch OFF.
- 6. Remove all ignition coil harness connectors to avoid the electrical discharge from the ignition coils.
- 7. Remove ignition coil and spark plug of the cylinder to be checked.
- 8. Crank engine for 5 seconds or more to remove combustion gas in the cylinder.
- 9. Connect spark plug and harness connector to ignition coil.
- 10. Fix ignition coil using a rope etc. with gap of 13 17 mm (0.52 -0.66 in) between the edge of the spark plug and grounded metal portion as shown in the figure.
- 11. Crank engine for about 3 seconds, and check whether spark is generated between the spark plug and the grounded metal portion.

Spark should be generated.

CAUTION:

· Do not approach to the spark plug and the ignition coil within 50 cm (19.7 in). Be careful not to get an electrical shock while checking, because the electrical discharge voltage becomes 20kV or more.



- It might cause to damage the ignition coil if the gap of more than 17 mm (0.66 in) is taken. NOTE:
- When the gap is less than 13 mm (0.52 in), the spark might be generated even if the coil is malfunctioning.

is the inspection result normal?

YES >> GO TO 8. NO >> GO TO 5.

5. CHECK FUNCTION OF IGNITION COIL-II

- 1. Turn ignition switch OFF.
- 2. Disconnect spark plug and connect a known-good spark plug.
- Crank engine for about 3 seconds, and recheck whether spark is generated between the spark plug and 3. the grounded metal portion.

## Spark should be generated.

## Is the inspection result normal?

YES >> GO TO 6.

NO >> Check ignition coil, power transistor and their circuits. Refer to EC-249, "Component Function Check°.

**6.**CHECK SPARK PLUG

Check the initial spark plug for fouling, etc.

Is the inspection result normal?

- YES >> Replace spark plug(s) with standard type one(s). For spark plug type, refer to EM-238, "Spark Plug",
- NO >> Repair or clean spark plug. Then GO TO 7.



## www.digitalkhodro.com www.digitalkhodro.com

7	CHECK FUNCTION OF IGNITION COIL-III
1. 2.	
	Spark should be generated.
ls	the inspection result normal?
N	'ES >> INSPECTION END IO >> Replace spark plug(s) with standard type one(s). For spark plug type, refer to <u>EM-238, "Spark</u> <u>Plug"</u> .
8.	CHECK COMPRESSION PRESSURE
Cł	neck compression pressure. Refer to EM-144, "Inspection".
	the inspection result normal?
	'ES >> GO TO 9. IO >> Check pistons, piston rings, valves, valve seats and cylinder head gaskets.
~	CHECK FUEL PRESSURE
-	
1. 2. 3.	Install all removed parts. Release fuel pressure to zero. Refer to <u>EC-287, "Inspection"</u> . Check fuel pressure. Refer to <u>EC-287, "Inspection"</u> .
	the inspection result normal?
N	YES >> GO TO 11. NO >> GO TO 10.
	O.DETECT MALFUNCTIONING PART
	neck fuel hoses and fuel tubes for clogging.
Y	the inspection result normal? 'ES >> Replace "fuel filter and fuel pump assembly". IO >> Repair or replace.
	1. CHECK IGNITION TIMING
_	or procedure, refer to EC-10, "BASIC INSPECTION : Special Repair Requirement".
Fc	or specification, refer to EC-290. "Idle Speed" and EC-290. "Ignition Timing".
-	the inspection result normal?
	'ES >> GO TO 12. IO >> Follow the EC-14, "IGNITION TIMING : Special Repair Requirement".
	2. CHECK HEATED OXYGEN SENSOR 1
	efer to <u>EC-107. "Component Inspection"</u> . the inspection result normal?
	/ES >> GO TO 13.
	IO >> Replace heated oxygen sensor 1.
1	3. CHECK MASS AIR FLOW SENSOR
Ē	With GST
Fo	neck mass air flow sensor signal in Service \$01 with GST. or specification, refer to <u>EC-290, "Mass Air Flow Sensor"</u> .
	the measurement value within the specification?
	<ul> <li>/ES &gt;&gt; GO TO 14.</li> <li>NO &gt;&gt; Check connectors for rusted terminals or loose connections in the mass air flow sensor circuit or ground. Refer to <u>EC-92, "DTC Logic"</u>.</li> </ul>
1	4.CHECK SYMPTOM TABLE
Cł	neck items on the rough idle symptom in EC-276, "Symptom Table".
	the inspection result normal?

## www.digitalkhodro.com

P0300, P0301, P0302, P0303, P0304 MISFIRE

www.digitalkhodro.com

< COMPONENT DIAGNOSIS >

[MR20DE]

YES >> GO TO 15. NO >> Repair or replace.

15. ERASE THE 1ST TRIP DTC

Some tests may cause a 1st trip DTC to be set. Erase the 1st trip DTC from the ECM memory after performing the tests. Refer to EC-73, "Diagnosis Description".

## >> GO TO 16.

**16.**CHECK INTERMITTENT INCIDENT

Refer to GI-38, "Intermittent Incident".

>> INSPECTION END

## حيجيتال خودره

شرکت دیجیتال خودرو سامانه (مسئولیت محدود)

اولین سامانه دیجیتال تعمیرکاران خودرو در ایران

.
P0327, P0328 KS

www.digitalkhodro.com

[MR20DE]

А

C

C

D

Ĝ

н

K

L

Μ

N

0

P

INFOID:000000004899902

### P0327, P0328 KS

< COMPONENT DIAGNOSIS >

#### Description

INFOID:000000004899900

INFOID-00000000489990;

The knock sensor is attached to the cylinder block. It senses engine knocking using a piezoelectric eler	
knocking vibration from the cylinder block is sensed as vibrational pressure. This pressure is converted	d into a
voltage signal and sent to the ECM.	, –
	,

#### DTC Logic

#### DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detected condition	Possible cause	-
P0327	Knock sensor circuit low input	An excessively low voltage from the sensor is sent to ECM.	Harness or connectors     (The sensor circuit is open or shorted.)	Ē
P0328	Knock sensor circuit high input	An excessively high voltage from the sensor is sent to ECM.	Knock sensor	_ F

#### DTC CONFIRMATION PROCEDURE

#### 1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

#### TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 10V at idle.

>> GO TO 2.

### 2.PERFORM DTC CONFIRMATION PROCEDURE

1. Start engine and run it for at least 5 seconds at idle speed.

2. Check 1st trip DTC.

#### Is 1st trip DTC detected?

YES >> Go to <u>EC-145, "Diagnosis Procedure"</u>. NO >> INSPECTION END

### Diagnosis Procedure

**1.**CHECK GROUND CONNECTION

1. Turn ignition switch OFF.

2. Check ground connection E21 and E38. Refer to Ground Inspection in <u>G1-40. "Circuit Inspection"</u>. <u>Is the inspection result normal?</u>

YES >> GO TO 2.

NO >> Repair or replace ground connection.

#### 2.CHECK KNOCK SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

- 1. Disconnect knock sensor harness connector and disconnect ECM harness connector.
- 2. Check the continuity between knock sensor harness connector and ECM harness connector.

Knock	sensor	ECM		Continuity	
Connector	Terminal			Continuity	
F12	2	F8	40	Existed	

3. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 3.

NO >> Repair open circuit or short to ground or short to power in harness or connectors.

#### P0327, P0328 KS

#### www.digitalkhodro.com

INFOID:00000000

[MR20DE]

### < COMPONENT DIAGNOSIS >

3. CHECK KNOCK SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check the continuity between knock sensor harness connector and ECM harness connector.

Knock s	sensor	EC	М	Continuity
Connector	Terminal	Connector	Continuity	
F12	- 1	F8	37	Existed

2. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 4.

NO >> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK KNOCK SENSOR

Refer to EC-146, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 5.

NO >> Replace knock sensor.

5. CHECK INTERMITTENT INCIDENT

Refer to GI-38, "Intermittent Incident".

>> INSPECTION END

Component Inspection

1.CHECK KNOCK SENSOR

- 1. Turn ignition switch OFF.
- 2. Disconnect knock sensor harness connector. .
- 3. Check resistance between knock sensor terminals as follows. NOTE:

It is necessary to use an ohmmeter which can measure more than 10 M $\Omega$ .

Terminals	Resistance [at 20°C (68°F)]
1 and 2	Approx. 532 - 588 kΩ

#### **CAUTION:**

Do not use any knock sensors that have been dropped or physically damaged. Use only new ones. Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace knock sensor.

### P0335 CKP SENSOR (POS)

www.digitalkhodro.com

[MR20DE]

G

н

Ν

0

D

INFOID-000000004899905





### DTC Logic

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
FUCS5 I	Crankshaft position sen- sor (POS) circuit	<ul> <li>The crankshaft position sensor (POS) signal is not detected by the ECM during the first few seconds of engine cranking.</li> <li>The proper pulse signal from the crankshaft position sensor (POS) is not sent to ECM while the engine is running.</li> <li>The crankshaft position sensor (POS) signal is not in the normal pattern during engine run- ning.</li> </ul>	<ul> <li>Harness or connectors [Crankshaft position sensor (POS) circuit is open or shorted.] (Refrigerant pressure sensor circuit is shorted.) (Accelerator pedal position sensor circuit is shorted.)</li> <li>Crankshaft position sensor (POS)</li> <li>Refrigerant pressure sensor</li> <li>Accelerator pedal position sensor</li> <li>Signal plate</li> </ul>

#### DTC CONFIRMATION PROCEDURE

#### 1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

#### **TESTING CONDITION:**

Before performing the following procedure, confirm that battery voltage is more than 10.5V with ignition switch ON.

>> GO TO 2.

### 2. PERFORM DTC CONFIRMATION PROCEDURE

1. Start engine and let it idle for at least 5 seconds. If engine does not start, crank engine for at least 2 seconds.

Check 1st trip DTC. 2.

Ż

### P0335 CKP SENSOR (POS)

www.digitalkhodro.com

[MR20DE]

< COMPONENT DIAGNOSIS >

Is 1st trip DTC detected?

YES >> Go to <u>EC-148, "Diagnosis Procedure"</u>. NO >> INSPECTION END

**Diagnosis Procedure** 

INFO(D:000000004899906

**1.**CHECK GROUND CONNECTION

1. Turn ignition switch OFF.

2. Check ground connection E21 and E38. Refer to Ground Inspection in GI-40, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.

NO >> Repair or replace ground connection.

2. CHECK CKP SENSOR (POS) POWER SUPPLY CIRCUIT-I

- 1. Disconnect crankshaft position (CKP) sensor (POS) harness connector.
- 2. Turn ignition switch ON.
- 3. Check the voltage between CKP sensor (POS) harness connector and ground.

CKP sen	sor (POS)	Ground	Voltage
Connector	Terminal	Ground Voltage	
F20	1	Ground	Approx. 5V

Is the inspection result normal?

YES >> GO TO 8.

NO >> GO TO 3.

#### CHECK CKP SENSOR (POS) POWER SUPPLY CIRCUIT-II

- 1. Turn ignition switch OFF.
- 2. Disconnect ECM harness connector.
- 3. Check the continuity between CKP sensor (POS) harness connector and ECM harness connector.

CKP sen	Continuity			
Connector	Terminal	Connector	Terminal	Continuity
F20	1	F8	75	Existed

Is the inspection result normal?

YES >> GO TO 4.

NO >> Repair open circuit.

4. CHECK SENSOR POWER SUPPLY CIRCUIT

Check harness for short to power and short to ground, between the following terminals.

EC	M	Sensor		
Connector	Terminal	Name	Connector	Terminal
F8	74	Refrigerant pressure sensor	E49	3
ГО	75	CKP sensor (POS)	F20	1 +
E16	102	APP sensor	E110	5

#### is the inspection result normal?

YES >> GO TO 5.

NO >> Repair short to ground or short to power in harness or connectors.

#### **5.**CHECK COMPONENTS

#### Check the following.

Refrigerant pressure sensor (Refer to <u>EC-256, "Diagnosis Procedure"</u>.)

Is the inspection result normal?

#### 021-62999292

#### EC-148

#### 021-62999292

< COMPO	NENT DI	AGNOSIS		35 CKP SENSOR (POS)	[MR20DE
NO >>	•	malfunctio	oning com	ponents.	
6.снеск				· · · · · · · · · · · · · · · · · · ·	
		omponent	•	0 	
		ult normal?	-		
	> GO TO > GO TO `				
			PEDAL A	SSEMBLY	,
		rator pedal			
		Special Re			
			-		
~ ·					
			S) GROU		
	nition sw	itch OFF. /I harness (	connector		
				ensor (POS) harness connector and ECM harness con	nector.
	<b>;</b>	-			•
CKP sens	or (POS)	EC	CM	Continuity	I
Connector	Terminal	Connector	Terminal		
F20	2	F8	62	Existed	
I <mark>s the ins</mark> pe YES >: NO >:	ection res > GO TO > Repair c	<mark>ult normal?</mark> 9. open circuit	t or short t	o ground or short to power in harness or connectors.	
Is the inspe YES >: NO >: 9.CHECK	ection res > GO TO > Repair c CKP SE	ult normal? 9. open circuit NSOR (PO	2 t or short to S) INPUT		nector.
Is the inspective YES >> NO >> 9.CHECK 1. Check	ection res > GO TO > Repair c CKP SEI the contin	ult normal? 9. open circuit NSOR (PO nuity betwe	t or short to S) INPUT een CKP s	o ground or short to power in harness or connectors. SIGNAL CIRCUIT FOR OPEN AND SHORT	nector.
I <mark>s the ins</mark> pe YES >: NO >: <b>9.</b> CHECK	ection res > GO TO > Repair c CKP SEI the contin	ult normal? 9. open circuit NSOR (PO	t or short to S) INPUT een CKP s	o ground or short to power in harness or connectors. SIGNAL CIRCUIT FOR OPEN AND SHORT	nector.
Is the inspective YES >> NO >> 9.CHECK 1. Check CKP sens	ection res > GO TO > Repair c CKP SE the contin	ult normal? 9. open circuit NSOR (PO nuity betwe	t or short to S) INPUT een CKP s	o ground or short to power in harness or connectors. SIGNAL CIRCUIT FOR OPEN AND SHORT ensor (POS) harness connector and ECM harness cont	nector.
Is the inspective YES >: NO >: 9.CHECK 1. Check CKP sens Connector F20	ection res > GO TO > Repair of CKP SE the contin the contin or (POS) Terminal 3	ult normal? 9. open circuit NSOR (PO nuity between EC Connector F8	t or short to S) INPUT een CKP s CM Terminal 61	o ground or short to power in harness or connectors. SIGNAL CIRCUIT FOR OPEN AND SHORT ensor (POS) harness connector and ECM harness connector Continuity	nector.
Is the inspective YES >: NO >: 9.CHECK 1. Check CKP sens Connector F20 2. Also cl Is the inspective	ection res > GO TO > Repair of CKP SE the contin or (POS) Terminal 3 heck harm ection res	ult normal? 9. open circuit NSOR (PO nuity betwee Connector F8 ness for sho ult normal?	t or short to S) INPUT een CKP s CM Terminal 61 ort to groun	o ground or short to power in harness or connectors. SIGNAL CIRCUIT FOR OPEN AND SHORT ensor (POS) harness connector and ECM harness connector Continuity	nector.
Is the inspective of the inspe	ection res > GO TO > Repair of CKP SE the contin or (POS) Terminal 3 heck harm ection res > GO TO	ult normal? 9. open circuit NSOR (PO nuity betwee Connector F8 ness for sho ult normal? 10.	t or short to S) INPUT een CKP s CM Terminal 61 ort to groun	c ground or short to power in harness or connectors. SIGNAL CIRCUIT FOR OPEN AND SHORT ensor (POS) harness connector and ECM harness connector continuity Existed and and short to power.	nector.
Is the inspective of the second secon	ection res > GO TO > Repair of CKP SEI the contin or (POS) Terminal 3 heck harm ection res > GO TO > Repair of	ult normal? 9. open circuit NSOR (PO nuity betwee EC Connector F8 ness for sho ult normal? 10. open circuit	t or short to S) INPUT een CKP s CM Terminal 61 ort to group 2 t or short to	o ground or short to power in harness or connectors. SIGNAL CIRCUIT FOR OPEN AND SHORT ensor (POS) harness connector and ECM harness connector Continuity Existed and and short to power.	nector.
Is the inspective of the second secon	ection res > GO TO > Repair of CKP SEI the contin or (POS) Terminal 3 heck harm ection res > GO TO > Repair of CK CRAN	ult normal? 9. open circuit NSOR (PO nuity betwee Connector F8 ness for sho ult normal? 10. open circuit KSHAFT F	t or short to S) INPUT een CKP s CM Terminal 61 ort to group ch or short to POSITION	o ground or short to power in harness or connectors. SIGNAL CIRCUIT FOR OPEN AND SHORT ensor (POS) harness connector and ECM harness connector Continuity Existed and and short to power.	nector.
Is the inspective of the second secon	ection res > GO TO > Repair of CKP SEI the contin or (POS) Terminal 3 heck harm ection res > GO TO > Repair of CK CRAN C-150, "C	ult normal? 9. open circuit NSOR (PO nuity betwee Connector F8 ness for sho ult normal? 10. open circuit KSHAFT F omponent	t or short to S) INPUT een CKP s CM Terminal 61 ort to groun ch or short to POSITION Inspection	o ground or short to power in harness or connectors. SIGNAL CIRCUIT FOR OPEN AND SHORT ensor (POS) harness connector and ECM harness connector Continuity Existed and and short to power.	nector.
Is the inspective of the second secon	ection res > GO TO > Repair of CKP SEI the contin or (POS) Terminal 3 heck ham ection res > GO TO > Repair of CK CRAN C-150, "C ection res	ult normal? 9. open circuit NSOR (PO nuity betwee EC Connector F8 ness for sho ult normal? 10. open circuit KSHAFT F omponent ult normal?	t or short to S) INPUT een CKP s CM Terminal 61 ort to groun ch or short to POSITION Inspection	o ground or short to power in harness or connectors. SIGNAL CIRCUIT FOR OPEN AND SHORT ensor (POS) harness connector and ECM harness connector Continuity Existed and and short to power.	nector.
s the inspective of the second	ection res > GO TO > Repair of CKP SEI the contin or (POS) Terminal 3 heck harm ection res > GO TO > Repair of CK CRAN C-150, "C ection res > GO TO	ult normal? 9. open circuit NSOR (PO nuity betwee EC Connector F8 ness for sho ult normal? 10. open circuit KSHAFT F omponent ult normal? 11.	t or short to S) INPUT een CKP s CM Terminal 61 ort to groun t or short to POSITION Inspection	o ground or short to power in harness or connectors. SIGNAL CIRCUIT FOR OPEN AND SHORT ensor (POS) harness connector and ECM harness connector Continuity Existed and and short to power.	nector.
Is the inspective of the second secon	ection res > GO TO > Repair of CKP SEI the contin or (POS) Terminal 3 heck harm ection res > GO TO > Repair of CK CRAN C-150, "C ection res > GO TO > Replace	ult normal? 9. open circuit NSOR (PO nuity betwee EC Connector F8 ness for sho ult normal? 10. open circuit KSHAFT F omponent ult normal? 11. e crankshaf	t or short to S) INPUT een CKP s CM Terminal 61 ort to groun t or short to POSITION Inspection	o ground or short to power in harness or connectors. SIGNAL CIRCUIT FOR OPEN AND SHORT ensor (POS) harness connector and ECM harness cont Continuity Existed ind and short to power. o ground or short to power in harness or connectors. SENSOR (POS)	nector.
Is the inspective of the second secon	ection res > GO TO > Repair of CKP SEI the contin or (POS) Terminal 3 heck harm ection res > GO TO > Repair of CK CRAN C-150, "C ection res > GO TO > Replace > GO TO > Replace	ult normal? 9. open circuit NSOR (PO nuity betwee EC Connector F8 ess for sho ult normal? 10. open circuit KSHAFT F omponent ult normal? 11. crankshaf TOOTH	t or short to S) INPUT een CKP s CM Terminal 61 ort to groun t or short to POSITION Inspection to position	o ground or short to power in harness or connectors. SIGNAL CIRCUIT FOR OPEN AND SHORT ensor (POS) harness connector and ECM harness connector Continuity Existed Ind and short to power. o ground or short to power in harness or connectors. SENSOR (POS) 	nector.
Is the inspective of the sense	ection res > GO TO > Repair of CKP SEI the contin or (POS) Terminal 3 heck ham ection res > GO TO > Repair of CK CRAN C-150, "C ection res > GO TO > Replace > GO TO > Replace	ult normal? 9. open circuit NSOR (PO nuity betwee EC Connector F8 ness for sho ult normal? 10. open circuit KSHAFT F omponent ult normal? 11. crankshaf TOOTH	t or short to S) INPUT een CKP s CM Terminal 61 ort to group t or short to POSITION Inspection t position al plate g	o ground or short to power in harness or connectors. SIGNAL CIRCUIT FOR OPEN AND SHORT ensor (POS) harness connector and ECM harness connector Continuity Existed Ind and short to power. o ground or short to power in harness or connectors. SENSOR (POS) 	nector.
Is the inspective of the second secon	ection res > GO TO > Repair of CKP SEI the contin or (POS) Terminal 3 heck ham ection res > GO TO > Repair of CK CRAN C-150, "C ection res > GO TO > Replace CK GEAR heck for ch ection res > GO TO	ult normal? 9. open circuit NSOR (PO nulty betwee EC Connector F8 ess for sho ult normal? 10. open circuit KSHAFT F omponent ult normal? 11. e crankshaf TOOTH hipping sign ult normal?	t or short to S) INPUT een CKP s CM Terminal 61 ort to groun t or short to POSITION Inspection t position that plate g	o ground or short to power in harness or connectors. SIGNAL CIRCUIT FOR OPEN AND SHORT ensor (POS) harness connector and ECM harness connector Continuity Existed Ind and short to power. o ground or short to power in harness or connectors. SENSOR (POS) 	nector.
Is the inspective of the second secon	ection res > GO TO > Repair of CKP SEI the contin or (POS) Terminal 3 heck harm ection res > GO TO > Repair of CK CRAN C-150, "C ection res > GO TO > Replace CK GEAR eck for ch ection res > GO TO > Replace	ult normal? 9. open circuit NSOR (PO nuity betwee EC Connector F8 ess for sho ult normal? 10. open circuit KSHAFT F omponent ult normal? 11. e crankshaf TOOTH nipping sign ult normal?	t or short to S) INPUT een CKP s CM Terminal 61 ort to groun t or short to POSITION Inspection t position ft position	o ground or short to power in harness or connectors. SIGNAL CIRCUIT FOR OPEN AND SHORT ensor (POS) harness connector and ECM harness cont Continuity Existed and and short to power. o ground or short to power in harness or connectors. SENSOR (POS) 	nector.

#### P0335 CKP SENSOR (POS)

#### < COMPONENT DIAGNOSIS >

#### >> INSPECTION END

Component Inspection

### 1.CHECK CRANKSHAFT POSITION SENSOR (POS)-I

- 1. Turn ignition switch OFF.
- 2. Loosen the fixing bolt of the sensor.
- 3. Disconnect crankshaft position sensor (POS) harness connector.
- 4. Remove the sensor.
- 5. Visually check the sensor for chipping.

#### Is the inspection result normal?

- YES >> GO TO 2.
- NO >> Replace crankshaft position sensor (POS).



### 2. CHECK CRANKSHAFT POSITION SENSOR (POS)-II

Check resistance between crankshaft position sensor (POS) terminals as follows.

Terminals (Polarity)	Resistance [at 25°C (77°F)]
1 (+) - 2 (-)	
1 (+) - 3 (-)	Except 0 or $\infty \Omega$
2 (+) - 3 (-)	1

YES >> INSPECTION END

NO >> Replace crankshaft position sensor (POS).

#### www.digitalkhodro.com

[MR20DE]

INFO/D.000000004899907

#### 021-62999292

### P0340 CMP SENSOR (PHASE)

< COMPONENT DIAGNOSIS >

P0340 CMP SENSOR (PHASE)

#### Description

The camshaft position sensor (PHASE) senses the retraction of camshaft (INT) to identify a particular cylinder. The camshaft position sensor (PHASE) senses the piston position.

When the crankshaft position sensor (POS) system becomes inoperative, the camshaft position sensor (PHASE) provides various controls of engine parts instead, utilizing timing of cylinder identification signals.

The sensor consists of a permanent magnet and Hall IC.

When engine is running, the high and low parts of the teeth cause the gap with the sensor to change.

The changing gap causes the magnetic field near the sensor to change.

Due to the changing magnetic field, the voltage from the sensor changes. ECM receives the signals as shown in the figure.



### DTC Logic

DTC DETECTION LOGIC

#### NOTE:

If DTC P0340 is displayed with DTC P1229, first perform the trouble diagnosis for DTC P1229. Refer to EC-202. "DTC Logic".

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause	•
P0340	Carnshaft position sen- sor (PHASE) circuit	<ul> <li>The cylinder No. signal is not sent to ECM for the first few seconds during engine cranking.</li> <li>The cylinder No. signal is not sent to ECM during engine running.</li> <li>The cylinder No. signal is not in the normal pattern during engine running.</li> </ul>		L . M

#### DTC CONFIRMATION PROCEDURE

#### **1.**PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

#### TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 10.5V with ignition switch ON.

#### >> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE-I

1. Start engine and let it idle for at least 5 seconds.

- If engine does not start, crank engine for at least 2 seconds.
- 2. Check 1st trip DTC.

INFCID.000000004899908

А

EC

С

D

Ē

F

G

Κ

N

0

021-62999292

PBIA9875.J

INFOID:000000004899909

igitalkhodro.com		www.digitalkhodro
	P0340 CMP SENSOR (PI	•
COMPONENT DIAGNO	SIS >	[MR20DE]
1st trip DTC detected?	· · ·	· · ·
YES >> Go to <u>EC-152.</u> NO >> GO TO 3.	"Diagnosis Procedure".	
	IRMATION PROCEDURE-II	
. Maintaining engine spe . Check 1st trip DTC.	eed at more than 800 rpm for at least 5 s	econds.
1st trip DTC detected?		
YES >> Go to EC-152.	"Diagnosis Procedure".	
NO >> INSPECTION	END	
iagnosis Procedure		INFO/D:000000004899910
CHECK STARTING SY		
	· · · · · ·	<u> </u>
urn ignition switch to STA	•	
i <u>oes the engine turn over?</u> YES >> GO TO 2.	Does the starter motor operate?	
NO >> Check starting	svstem.	
CHECK GROUND CON	-	
. Turn ignition switch OF	· · · · · · · · · · · · · · · · · · ·	
	ion E21 Refer to Ground Inspection in <u>G</u>	I-40, "Circuit Inspection".
the inspection result non	nal?	
YES >> GO TO 3.		
1. A	(PHASE) POWER SUPPLY CIRCUIT	
<ul> <li>Disconnect camshaft p</li> <li>Turn ignition switch ON</li> </ul>	oosition (CMP) sensor (PHASE) harness	connector.
	ween CMP sensor (PHASE) harness con	nector and ground.
4 اران خود رود رار	البينية الترجيب والماسي	
CMP sensor (PHASE) Ground	U Voltage	
Connector Terminal	Vollage	
F26 1 Ground	Approx. 5V	
s the inspection result nor	mal?	
YES >> GO TO 4.		
· · ·	rcuit or short to ground or short to power	
F.CHECK CMP SENSOF	(PHASE) GROUND CIRCUIT FOR OPI	EN AND SHORT
. Turn ignition switch Of	=F	
	etween CMP sensor (PHASE) harness o	

CMP senso	r (PHASE)	EC	M	Continuity
Connector	Terminal	Connector	Terminal	Continuity
F26	2	F8	63	Existed

3. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 5.

>> Repair open circuit or short to ground or short to power in harness or connectors. NO

**5.**CHECK CMP SENSOR (PHASE) INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.

2. Check the continuity between CMP sensor (PHASE) hamess connector and ECM harness connector.

### P0340 CMP SENSOR (PHASE)



### P0340 CMP SENSOR (PHASE)

< COMPONENT DIAGNOSIS >

www.digitalkhodro.com

[MR20DE]

Terminals (Polarity)	Resistance [at 25°C (77°F)]
1 (+) - 2 (-)	· · · · · · · · · · · · · · · · · · ·
1 (+) - 3 (-)	Except 0 or $\infty \Omega$
2 (+) - 3 (-)	

Is the inspection result normal?

>> INSPECTION END YES

NO >> Replace camshaft position sensor (PHASE).





021-62999292

021-62999292

#### P0420 THREE WAY CATALYST FUNCTION

#### < COMPONENT DIAGNOSIS >

### P0420 THREE WAY CATALYST FUNCTION

#### **DTC Logic**

#### DTC DETECTION LOGIC

The ECM monitors the switching frequency ratio of heated oxygen sensor 1 and heated oxygen sensor 2.

A three way catalyst (manifold) with high oxygen storage capacity will indicate a low switching frequency of heated oxygen sensor 2. As oxygen storage capacity decreases, the heated oxygen sensor 2 switching frequency will increase.

When the frequency ratio of heated oxygen sensor 1 and heated oxygen sensor 2 approaches a specified limit value, the three way catalyst (manifold) malfunction is diagnosed.



DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause	1	
P0420	Catalyst system efficien- cy below threshold	<ul> <li>Three way catalyst (manifold) does not oper- ate properly.</li> <li>Three way catalyst (manifold) does not have enough oxygen storage capacity.</li> </ul>	<ul> <li>Three way catalyst (manifold)</li> <li>Exhaust tube</li> <li>Intake air leaks</li> <li>Fuel injector</li> <li>Fuel injector leaks</li> <li>Spark plug</li> <li>Improper ignition timing</li> </ul>		G H

#### Component Function Check

#### 1.PERFORM COMPONENT FUNCTION CHECK-I

1. Start engine and warm it up to the normal operating temperature.

- 2. Turn ignition switch OFF and wait at least 10 seconds.
- Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
   Let engine idle for 1 minute.
- 5. Check the voltage between ECM harness connector terminals under the following condition.

	ECM			í.	
Connector	+	-	Condition	Specification	
Connector	Terminal	Terminal			
F8	49 (HO2S1 signal)	56	Keeping engine speed at 2,000 rpm constant under no load	The voltage switch periodically more than 5 times within 10 seconds.	-

#### Is the inspection result normal?

YES >> GO TO 2

NO >> Go to EC-108, "DTC Logic".

#### 2.PERFORM COMPONENT FUNCTION CHECK-II

- 1. Set voltmeter probes between ECM harness connector terminals.
- Make sure that the voltage switching frequency (high&low) HO2S2 voltage is very less than that of HO2S1 voltage under the following condition.

#### [MR20DE]

INFO/D;000000004899912

NFOID-000000004899913

А

F

Κ

N

0

### P0420 THREE WAY CATALYST FUNCTION

www.digitalkhodro.com

< COMPONENT DIAGNOSIS >

[MR20DE]

<u> </u>	ECM				
	+	-	Condition	Specification	
Connector	Terminal	Terminal			:
	49 (HO2S1 signal)	56	Keeping engine speed at 2,000	Switching frequency ratio (A/B): Less than 0.7 A: Heated oxygen sensor 2 voltage switching	
	50 (HO2S2 signal)	59	rpm constant under no load	B: Heated oxygen sensor 1 voltage switching	
	ection result no				Į
	INSPECTION If the ratio is to <u>EC-156.</u> "	greater t	han above (0.75), it means the Procedure".	nree way catalyst does not operate pro	operly. Go
Diagnos	sis Procedu	re		INFOID	: :000000000489991
<b>1.</b> CHECK	K EXHAUST S	YSTEM			
•	•		muffler for dent.	•	1
	ection result no	ormal?	· · · ·		
	<ul> <li>&gt; GO TO 2.</li> <li>&gt; Repair or repair</li></ul>	, lace			
-	K EXHAUST G				1
	engine and run				;
			c before the three way cataly	st (manifold).	
			Three way catalyst (Manifold)	Three way catalyst (Under floor) Muffler	
ت محد	ہ (مسئولیں	HO2S1	HO2S2		
ودرايرا	To exhaust ma	nifold 🗪			Ì
	🕩 : Exhaust gas			SEC502D	
Is exhaus	t gas leak dete	cted?			
_NO >	<ul> <li>Repair or replace</li> <li>GO TO 3.</li> </ul>				
3.CHEC	K INTAKE AIR	LEAK		•	i.
Listen for	an intake air le	ak after t	he mass air flow sensor.		4
<u>Is intake a</u>	<u>air leak detecte</u>	<u>d?</u>			
	> Repair or replaced by the second	place.			t.
4					
			DIDLE SPEED		!
			to <u>EC-10, "BASIC INSPECTI</u> , "Ignition Timing", EC-290, "	ON : Special Repair Requirement" Idle Speed".	ц 1
	pection result n	•			
				epair Requirement",EC-14, "IDLE SPE	ED : Spe
5 CHEC	<u>cial Repair F</u> K FUEL INJEC		<u>enn</u> .	· · · · · · · · · · · · · · · · · · ·	1 .
J.OHLU		non			
1 01	الالحيا مساسمهم				
			nition switch ON. CM harness connector term	inals.	1

## P0420 THREE WAY CATALYST FUNCTION

COMPC	NENT D	IAGNOS	S >		<u></u>	[MR20DE]	
		CM					A
+	7			Voltage			
Connector	Terminal	Connector	Terminal	Vonage		i	
	25		-	· · · · · · · · · · · · · · · · · · ·			E
	29	<b>5</b> 10					
F7	30	E16	108	Battery voltage			C
	31						
the insp	ection re	<u>sult norma</u>	<u>l?</u>			,	C
	> GO TO		"Diagao	ain Propoduro"			•••
		n <u>ec-244.</u> ION OF IG	-	sis Procedure".			
							E
AUTION o the fol		rocedure	in the p	ace where ventila	tion is good	without the combustible.	
Turn i	gnition sv	vitch OFF.	_				F
	ive tuel pi engine.	ump tuse II		E/R to release fuel	pressure.	· · ·	
After	engine st	alls, crank	it two or	three times to relea	ise all fuel pre	essure.	C
		vitch OFF. ition coil ha	arness co	onnectors to avoid	the electrical	discharge from the ignition coils.	i.
Remo	ve ignitio	n coil and	spark plu	ig of the cylinder to	be checked.		
				re to remove comb connector to ignitio		the cylinder.	ł
				with gap of 13 - 17			
0.66 i	n) betwee	en the edge	e of the s	park plug and grou		VELO	
		vn in the fig or about 3		s, and check whet	ner spark is		
gener				and the grounded			
tion.	اخمده				പ്പില്		•
Sp	ark shou	Ild be gen	erated.			13 - 17 mm	
CAUT	ION:					Grounded metal portion	ŀ
				k plug and the ig		(Cylinder head, cylinder block, etc.)	
				eful not to get a se the electrical		JMBIA0066GB	1
volt	age beco	omes 20k	l or mor	e.	-		I
• It m NOTE	ight cau:	se to dama	age the i	ignition coil if the	gap of more	than 17 mm (0.66 in) is taken. ب	
When	the gap	is less th	han 13 n	nm (0.52 in), the	park might	be generated even if the coll is mal-	ŀ
	ioning.		10			1	
		<u>sult norma</u>	<u>.1?</u>				1
	> GO TC > GO TC						-
CHECI	K FUNCT		INITION	COIL-II			
		vitch OFF.					. (
. Disco	nnect spa	ark plug an	d conne	ct a known-good s	ark plug.	· · · · · · · · · · · · · · · · · · ·	
		or about 3 netal portic		s, and recheck who	mer spark is	generated between the spark plug and	F
•		•					
•		ıld be gen					
the insp		<u>sult norma</u>	<u>l?</u>				
YES >	> GO TC	_				(	

021-62999292

### EC-157

# P0420 THREE WAY CATALYST FUNCTION

www.digitalkhodro.com

P0420 THREE WAY CATALYST FUNCTION	,
< COMPONENT DIAGNOSIS >	[MR20DE]
8.CHECK SPARK PLUG	1
Check the initial spark plug for fouling, etc. Is the inspection result normal? YES >> Replace spark plug(s) with standard type one(s). For spark plug type, refer to <u>EM-238, "Spark Plug"</u> . NO >> Repair or clean spark plug. Then GO TO 9.	
	SEF1561
9.CHECK FUNCTION OF IGNITION COIL-III	
<ol> <li>Reconnect the initial spark plugs.</li> <li>Crank engine for about three seconds, and recheck whether spark is generated betwee and the grounded portion.</li> </ol>	en the spark plug
Spark should be generated.	•
Is the inspection result normal?	I
YES >> INSPECTION END NO >> Replace spark plug(s) with standard type one(s). For spark plug type, refer t <u>Plug"</u> .	to <u>EM-238, "Spart</u>
10. CHECK FUEL INJECTOR	
Turn ignition switch OFF.	i
<ol> <li>Remove fuel injector assembly.</li> <li>Refer to <u>EM-157, "Removal and Installation"</u>.</li> </ol>	
Keep fuel hose and all fuel injectors connected to fuel tube.	i i
<ol> <li>Disconnect all ignition coil harness connectors.</li> <li>Reconnect all fuel injector harness connectors disconnected.</li> </ol>	
5. Turn ignition switch ON.	
Does fuel drip from fuel injector?	
YES >> Replace the fuel injector(s) from which fuel is dripping.	i
NO >> GO TO 11.	1
Refer to GI-38, "Intermittent Incident".	
<u>Is the trouble fixed?</u> YES >> INSPECTION END	1
NO >> Replace three way catalyst (manifold).	
	3
	ï
	+
	:
	1

#### www.digitalkhodro.com P0444 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

#### < COMPONENT DIAGNOSIS >

#### P0444 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

#### Description

The EVAP canister purge volume control solenoid valve uses a ON/ OFF duty to control the flow rate of fuel vapor from the EVAP canister. The EVAP canister purge volume control solenoid valve is moved by ON/OFF pulses from the ECM. The longer the ON pulse, the greater the amount of fuel vapor that will flow through the valve.

#### DTC Logic

#### DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause	
P0444	EVAP canister purge volume control solenoid valve circuit open	An excessively low voltage signal is sent to ECM through the valve	<ul> <li>Harness or connectors (The solenoid valve circuit is open or shorted.)</li> <li>EVAP canister purge volume control so- lenoid valve</li> </ul>	G H
DTC CON	FIRMATION PROCEDU	RE ••• • ••		

#### 1.CONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test. **TESTING CONDITION:** 

Before performing the following procedure, confirm battery voltage is more than 11V at idle.

>> GO TO 2.

#### 2. PERFORM DTC CONFIRMATION PROCEDURE

1. Start engine and let it idle for at least 13 seconds.

2. Check 1st trip DTC.

#### Is 1st trip DTC detected?

- YES >> Go to EC-159, "Diagnosis Procedure".
- NO >> INSPECTION END

#### Diagnosis Procedure

#### 1. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.

- 2. Disconnect EVAP canister purge volume control solenoid valve harness connector.
- 3. Turn ignition switch ON.
- Check the voltage between EVAP canister purge volume control solenoid valve harness connector and ground.

	r purge volume enoid valve	Ground	Voltage
Connector	Terminal		
F32	1	Ground	Battery voltage

Is the inspection result normal?

[MR20DE]

INFOID:000000004899915

PBIA9215.

INFOID:000000004899916

А

EC

С

D

Ε

J

K

М

N

O

Ρ

INFOID:000000004899917

	ENT DIAGNO	)SIS >			[MR20DE]
	O TO 3.				
4	O TO 2.				1
	MALFUNCTIC	JNING PART			
Harness for	nnectors E7, I open or shor	t between EVA		urge volume control solenoi urge volume control solenoi	
>> F	Repair open ci	rcuit or short to	o ground or s	hort to power in harness or	connectors.
	VAP CANIST	ER PURGE V	OLUME CON	ITROL SOLENOID VALVE	OUTPUT SIGNAL CIRCUI
<ol> <li>Disconne</li> <li>Check th</li> </ol>		ess connector. etween EVAP	canister purg	e volume control solenoid v	valve harness connector and
	r purge volume lenoid valve	EC	M	Continuity	
Connector	Terminal	Connector	Terminal	,	T.
F32	: <b>2</b>	F7	9	Existed	
YES >> 0 NO >> F 4.CHECK E Refer to <u>EC-</u>	tion résult non GO TO 4. Repair open ci VAP CANIST	rcuit or short to ER PURGE Vo	o ground or s OLUME CON	hort to power in harness or ITROL SOLENOID VALVE	connectors.
$\begin{array}{c c} YES & >> 0\\ NO & >> F\\ \hline \textbf{4.CHECK E}\\ \hline \textbf{Refer to } \underline{EC}\\ \hline \textbf{s the inspect}\\ YES & >> 0\\ \hline \textbf{NO} & >> F\\ \end{array}$	tion résult non GO TO 4. Repair open ci EVAP CANIST 160, "Compon tion result non GO TO 5. Replace EVAF	mal? Ircuit or short to ER PURGE Vo nent Inspection mal? P canister purg	o ground or s OLUME CON <u>"</u> .		connectors.
$\begin{array}{llllllllllllllllllllllllllllllllllll$	tion résult non GO TO 4. Repair open ci EVAP CANIST 160, "Compon tion result non GO TO 5. Replace EVAP NTERMITTEN	mal? Incuit or short to ER PURGE Vo Inent Inspection mal? Canister purg IT INCIDENT	o ground or s OLUME CON <u>"</u> .		connectors.
$\begin{array}{llllllllllllllllllllllllllllllllllll$	tion résult non GO TO 4. Repair open ci EVAP CANIST 160, "Compon tion result non GO TO 5. Replace EVAF	mal? Incuit or short to ER PURGE Vo Inent Inspection mal? Canister purg IT INCIDENT	o ground or s OLUME CON <u>"</u> .		r connectors.
YES $>> 0$ NO $>> F$ 4.CHECK E Refer to EC- s the inspect YES $>> 0$ NO $>> F$ 5.CHECK IT Refer to GI-3	tion résult non GO TO 4. Repair open ci EVAP CANIST 160, "Compon tion result non GO TO 5. Replace EVAP NTERMITTEN 18, "Intermitter	mal? Ircuit or short to ER PURGE Vo ment Inspection mal? Canister purg IT INCIDENT It Incident".	o ground or s OLUME CON <u>"</u> .		connectors.
YES $>> 0$ NO $>> F$ 4.CHECK E Refer to EC- s the inspect YES $>> 0$ NO $>> F$ 5.CHECK II Refer to GI-3 >> 1	tion result non GO TO 4. Repair open ci EVAP CANIST 160, "Compor tion result non GO TO 5. Replace EVAP NTERMITTEN 8, "Intermitter	mal? Ircuit or short to ER PURGE Vo ment Inspection mal? Canister purg IT INCIDENT It Incident".	o ground or s OLUME CON <u>"</u> .		
YES $>> 0$ NO $>> F$ 4.CHECK E Refer to EC- S the inspect YES $>> 0$ NO $>> F$ 5.CHECK II Refer to GI-3 >> 1 Compone	tion result non GO TO 4. Repair open ci EVAP CANIST 160, "Compon tion result non GO TO 5. Replace EVAP NTERMITTEN 8, "Intermitter NSPECTION nt Inspectio	mal? ircuit or short to ER PURGE Vo ment Inspection mal? Canister purg IT INCIDENT It Incident". END	o ground or s OLUME CON ". e volume cor	ITROL SOLENOID VALVE	INFOID:000000048995
YES $>> 0$ NO $>> F$ 4.CHECK E Refer to EC- S the inspect YES $>> 0$ NO $>> F$ 5.CHECK II Refer to GI-3 >> 1 Compone 1.CHECK E	tion result non GO TO 4. Repair open ci EVAP CANIST 160, "Compon tion result non GO TO 5. Replace EVAP NTERMITTEN 8, "Intermitter NSPECTION nt Inspectio	mal? rcuit or short to ER PURGE Vo nent Inspection mal? Canister purg IT INCIDENT nt Incident". END DN ER PURGE Vo	o ground or s OLUME CON ". e volume cor		INFOID:000000048995
YES $>> 0$ NO $>> F$ 4.CHECK E Refer to EC- s the inspect YES $>> 0$ NO $>> F$ 5.CHECK II Refer to GI-3 >> I Compone 1.CHECK E 1. Turn igni 2. Disconne 3. Remove 4. Disconne	tion result non GO TO 4. Repair open ci EVAP CANIST 160, "Compon- tion result non GO TO 5. Replace EVAF NTERMITTEN 8, "Intermitter NSPECTION nt Inspection EVAP CANIST ect EVAP can EVAP caniste ect EVAP purg ir passage co	mal? rcuit or short to ER PURGE Vo mal? Canister purg IT INCIDENT T INCIDENT T INCIDENT END ON ER PURGE Vo FF. ister purge volum ge hose conne	o ground or s OLUME CON e volume cor OLUME CON ume control sol icted to EVAR	ITROL SOLENOID VALVE	INFOID:000000048555
YES $>> 0$ NO $>> F$ 4.CHECK E Refer to EC- s the inspect YES $>> 0$ NO $>> F$ 5.CHECK II Refer to GI-3 >> 1 Compone 1.CHECK E 1. Turn igni 2. Disconne 3. Remove 4. Disconne 5. Check a condition	tion result non GO TO 4. Repair open ci EVAP CANIST 160, "Compon- tion result non GO TO 5. Replace EVAF NTERMITTEN 8, "Intermitter NSPECTION nt Inspection EVAP CANIST ect EVAP can EVAP caniste ect EVAP purg ir passage co	mal? rcuit or short to ER PURGE Vo mal? Canister purg T INCIDENT at Incident". END DN ER PURGE Vo FF. ister purge volum ge hose conne ontinuity of EV/	o ground or s OLUME CON e volume cor OLUME CON ume control sol icted to EVAR	ITROL SOLENOID VALVE	INFOID:000000048555
YES $>> 0$ NO $>> F$ 4.CHECK E Refer to EC- s the inspect YES $>> 0$ NO $>> F$ 5.CHECK II Refer to GI-3 >> 1 Componen 1.CHECK E 1. Turn igni 2. Disconne 3. Remove 4. Disconne 5. Check a condition	tion result non GO TO 4. Repair open ci EVAP CANIST 160. "Compon- tion result non GO TO 5. Replace EVAF NTERMITTEN 8. "Intermitter NSPECTION nt Inspection EVAP CANIST ition switch Of ect EVAP caniste ect EVAP caniste ect EVAP caniste ect EVAP purg ir passage co ns.	mal? rcuit or short to ER PURGE Vo mal? P canister purg IT INCIDENT IT INCIDE	o ground or s OLUME CON e volume cor OLUME CON ume control sole cted to EVAR AP canister p	ITROL SOLENOID VALVE	INFOID:000000048555
YES >> 0 NO >> F 4.CHECK E Refer to EC- s the inspect YES >> 0 NO >> F 5.CHECK II Refer to GI-3 >> I Compone 1.CHECK E 1. Turn igni 2. Disconne 3. Remove 4. Disconne 5. Check a condition	tion result non GO TO 4. Repair open ci EVAP CANIST 160. "Compon- tion result non GO TO 5. Replace EVAF NTERMITTEN 8. "Intermitter NSPECTION nt Inspection EVAP CANIST ition switch Of ect EVAP caniste ect EVAP caniste ect EVAP caniste ect EVAP purg ir passage co ns.	mal? ircuit or short to ER PURGE Vo inent Inspection mal? Canister purg IT INCIDENT IT INC	o ground or s OLUME CON e volume cor OLUME CON ume control sol cted to EVAR AP canister p passage continu tween (A) and (	ITROL SOLENOID VALVE	INFOID:000000048555

021-62999292

EC-160

WWV

		P0500 VSS	MB20DE1	
	NENT DIAGNOSIS >	•	[MR20DE]	
0500	VSS		i	,
escripti	ion		INFOID:000000004899919	
	e speed signal is sent ation line.	t to the ECM from the "ABS actuate	or and electric unit (control unit)" by CAN	E
TC Log	gic		INFOID:00000004899920	
TC DET OTE:	, ECTION LOGIC			(
lf DTC F U1000, U	J1001.Refer to EC-87	. "DTC Logic".	erform the trouble diagnosis for DTC	ł
	"USUU IS displayed wi 3. "DTC Logic".	th DTC 01010, first perform the t	rouble diagnosis for DTC U1010. Refer	I
DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause	
		The almost 0 km/h (0 MPH) signal from	<ul> <li>Harness or connectors (The CAN communication line is open or short- ed)</li> <li>Harness or connectors</li> </ul>	I
20500	Vehicle speed sensor	vehicle speed signal is sent to ECM even when vehicle is being driven.	(The vehicle speed signal circuit is open or shorted)	
			<ul> <li>Wheel sensor</li> <li>ABS actuator and electric unit (control unit)<sup>1</sup></li> </ul>	
ompon	ent Function Che		<ul> <li>Wheel sensor</li> <li>ABS actuator and electric unit (control unit)</li> </ul>	•
	ent Function Che		Wheel sensor	
	ent Function Che		<ul> <li>Wheel sensor</li> <li>ABS actuator and electric unit (control unit)</li> </ul>	
.PERFO			<ul> <li>Wheel sensor</li> <li>ABS actuator and electric unit (control unit)</li> </ul>	
PERFO	RM COMPONENT FL ST drive wheels.	JNCTION CHECK	<ul> <li>Wheel sensor</li> <li>ABS actuator and electric unit (control unit)</li> </ul>	
PERFO	RM COMPONENT FL ST drive wheels. engine. vehicle speed signal ir	JNCTION CHECK	Wheel sensor     ABS actuator and electric unit (control unit)	
PERFO With GS Lift up Start e Read The ve suitabl	RM COMPONENT FL ST drive wheels. orgine. vehicle speed signal in whicle speed signal on le gear position.	JNCTION CHECK	<ul> <li>Wheel sensor</li> <li>ABS actuator and electric unit (control unit)</li> </ul>	
PERFO With GS Lift up Start e Read The ve suitabl the inspe	RM COMPONENT FL drive wheels. ongine. vehicle speed signal in ehicle speed signal on le gear position. ection result normal?	JNCTION CHECK	Wheel sensor     ABS actuator and electric unit (control unit)	
PERFO With GS Lift up Start e Read The ve suitabl the inspection (ES >:	RM COMPONENT FL ST drive wheels. orgine. vehicle speed signal in whicle speed signal on le gear position.	Service \$01 with GST. GST should be able to exceed 10	Wheel sensor     ABS actuator and electric unit (control unit)	
PERFO With GS Lift up Start e Read The ve suitabl the insp (ES >: IO >:	RM COMPONENT FL drive wheels. orgine. vehicle speed signal in ehicle speed signal on le gear position. ection result normal? > INSPECTION END	Service \$01 with GST. GST should be able to exceed 10	Wheel sensor     ABS actuator and electric unit (control unit)	
PERFO With GS Lift up Start e Read The ve suitabl the inspe (ES >: NO >: iagnos	ARM COMPONENT FL drive wheels. angine. vehicle speed signal in ehicle speed signal on le gear position. ection result normal? > INSPECTION END > Go to EC-161, "Diag is Procedure	Service \$01 with GST. GST should be able to exceed 10	• Wheel sensor • ABS actuator and electric unit (control unit) INFOID:000000004859521 km/h (6 MPH) when rotating wheels with	
PERFO With GS Lift up Start e Read The ve suitabl the inspo (ES >: NO >: iagnos .CHECK	ARM COMPONENT FL drive wheels. angine. vehicle speed signal in ehicle speed signal on le gear position. ection result normal? > INSPECTION END > Go to EC-161, "Diag is Procedure	UNCTION CHECK Service \$01 with GST. GST should be able to exceed 10 mosis Procedure".	• Wheel sensor • ABS actuator and electric unit (control unit) INFOID:000000004859521 km/h (6 MPH) when rotating wheels with	
PERFO With GS Lift up Start e Read The ve suitabl the inspu- (ES >: IO >: iagnos .CHECK	ARM COMPONENT FL or and the speed signal in whicle speed signal in the gear position. ection result normal? > INSPECTION END > Go to EC-161, "Diag is Procedure	UNCTION CHECK Service \$01 with GST. GST should be able to exceed 10 mosis Procedure".	• Wheel sensor • ABS actuator and electric unit (control unit) INFOID:000000004859521 km/h (6 MPH) when rotating wheels with	
PERFO With GS Lift up Start e Read The ve suitabl the inspu- (ES >: IO >: iagnos .CHECK efer to <u>BI</u> <u>DTC del</u>	ARM COMPONENT FU drive wheels. orgine. vehicle speed signal in encion result normal? > INSPECTION END > Go to EC-161, "Diag is Procedure CDTC WITH "ABS AC RC-49, "Diagnostic Wo tected? > INSPECTION END	UNCTION CHECK Service \$01 with GST. GST should be able to exceed 10 mosis Procedure".	• Wheel sensor • ABS actuator and electric unit (control unit) INFOID:000000004859521 km/h (6 MPH) when rotating wheels with	
PERFO With GS Lift up Start e Read The ve suitabl the inspu- (ES >: IO >: iagnos .CHECK efer to <u>BI</u> <u>DTC del</u>	ARM COMPONENT FU drive wheels. orgine. vehicle speed signal in encion result normal? > INSPECTION END > Go to EC-161, "Diag is Procedure CDTC WITH "ABS AC RC-49, "Diagnostic Wo tected? > INSPECTION END	JNCTION CHECK Service \$01 with GST. GST should be able to exceed 10 mosis Procedure". TUATOR AND ELECTRIC UNIT (Control of the second s	• Wheel sensor • ABS actuator and electric unit (control unit) INFOID:000000004859521 km/h (6 MPH) when rotating wheels with	
.PERFO With GS Lift up Start e Read The ve suitabl the inspu- (ES >: NO >: iagnos .CHECK efer to <u>BI</u> <u>DTC del</u>	ARM COMPONENT FU drive wheels. orgine. vehicle speed signal in encion result normal? > INSPECTION END > Go to EC-161, "Diag is Procedure CDTC WITH "ABS AC RC-49, "Diagnostic Wo tected? > INSPECTION END	JNCTION CHECK Service \$01 with GST. GST should be able to exceed 10 mosis Procedure". TUATOR AND ELECTRIC UNIT (Control of the second s	• Wheel sensor • ABS actuator and electric unit (control unit) INFOID:000000004859521 km/h (6 MPH) when rotating wheels with	
.PERFO With GS Lift up Start e Read The ve suitabl the inspu- (ES >: NO >: iagnos .CHECK efer to <u>BI</u> <u>DTC del</u>	ARM COMPONENT FU drive wheels. orgine. vehicle speed signal in encion result normal? > INSPECTION END > Go to EC-161, "Diag is Procedure CDTC WITH "ABS AC RC-49, "Diagnostic Wo tected? > INSPECTION END	JNCTION CHECK Service \$01 with GST. GST should be able to exceed 10 mosis Procedure". TUATOR AND ELECTRIC UNIT (Control of the second s	• Wheel sensor • ABS actuator and electric unit (control unit) INFOID:000000004859521 km/h (6 MPH) when rotating wheels with	
.PERFO With GS Lift up Start e Read The ve suitabl the inspu- (ES >: NO >: iagnos .CHECK efer to <u>BI</u> <u>DTC del</u>	ARM COMPONENT FU drive wheels. orgine. vehicle speed signal in encion result normal? > INSPECTION END > Go to EC-161, "Diag is Procedure CDTC WITH "ABS AC RC-49, "Diagnostic Wo tected? > INSPECTION END	JNCTION CHECK Service \$01 with GST. GST should be able to exceed 10 mosis Procedure". TUATOR AND ELECTRIC UNIT (Control of the second s	• Wheel sensor • ABS actuator and electric unit (control unit) INFOID:000000004859521 km/h (6 MPH) when rotating wheels with	

021-62999292

021-62999292

#### **P0605 ECM**

#### < COMPONENT DIAGNOSIS >

#### P0605 ECM

#### Description

The ECM consists of a microcomputer and connectors for signal input and output and for power supply. The ECM controls the engine.

## **DTC Logic**

DTC No.

#### DTC DETECTION LOGIC

Trouble diagnosis name

		A)	ECM calculation function is malfunctioning.	
P0605	Engine control module	B)	ECM EEP-ROM system is malfunctioning.	• ECM
		C)	C) ECM self shut-off function is malfunctioning.	
DTC CON	FIRMATION PROC	EDU	RE	
1.PRECO				
If DTC Cor	firmation Procedure	has h	een previously conducted, always turn	ignition switch OFF and wait at
	conds before conduct			
			Ilter estile la state	
,	GO TO 2.		اوس سمته ديجيتار	
2.PERFO	RM DTC CONFIRMA	TION	PROCEDURE FOR MALFUNCTION A	
	nition switch ON.			· · · · · · · · · · · · · · · · · · ·
	1st trip DTC.			<u>:</u>
	TC detected?		· · · · · · · · · · · · · · · · · · ·	
	> Go to <u>EC-163, "Diac</u> > GO TO 3.	Inosis	<u>s Procedure"</u> .	ţ
~			PROCEDURE FOR MALFUNCTION B	
				<u> </u>
	nition switch ON and Inition switch OFF. wa		east 10 seconds, and then turn ON.	
	1st trip DTC.		· · · · · · · · · · · · · · · · · · ·	1
<u>Is 1st trip D</u>	DTC detected?			
	> Go to <u>EC-163. "Diac</u>	nosi	s Procedure".	
4	> GO TO 4.			
4.PERFO		NOIT	PROCEDURE FOR MALFUNCTION C	
	nition switch ON and			

DTC detecting condition

2. Turn ignition switch OFF, wait at least 10 seconds, and then turn ON.

- Repeat step 2 for 32 times. 3.
- 4. Check 1st trip DTC.

#### Is 1st trip DTC detected?

- YES >> Go to EC-163. "Diagnosis Procedure".
- NO >> INSPECTION END

www.digitalkhodro.com

INFOID:000000004899923

INFOID:000000004899924

021-62999292

Possible cause



v.digitalkhodro.com	P0605 ECM	WWW	.digitalkhodro.d	com
< COMPONENT DIAGNOSIS >			[MR20DE]	1
Diagnosis Procedure	ş	•	INFOID:000000004899925	A
<b>1.INSPECTION START</b>			•	
<ol> <li>Erase DTC.</li> <li>Perform DTC CONFIRMATION P See EC 162 "DTC Logic"</li> </ol>	ROCEDURE.	·		EC
See <u>EC-162, "DTC Logic"</u> . <u>Is the 1st trip DTC P0605 displayed a</u> YES >> GO TO 2.	gain?	• •	\$ #	с
NO E>> INSPECTION END				1
2.REPLACE ECM 1. Replace ECM.				D
	IVICE WHEN REPLACING CONTE	ROL UNIT : Special	Repair Require-	
•				E
>> INSPECTION END				F
:				
•		1 <b>.</b>	ļ	G
			-	
			ŧ	H
رو سامانه (مسئولیت محد	شرکت دیجیتال خودر			
رتعمير كاران خودر ودر ايرار				J
a 2 .			+ 	К
				L
				M I
· ,				N I
			a.	Ì
			ſ	0
	•		1	
			f	P I
	-:			1
			4 1 1 1	
	, ·	₹ * <u>.</u>	ŕ	1
62999292	EC-163		021-62999	292

P1111 IVT CONTROL SOLENOID VALVE

#### < COMPONENT DIAGNOSIS >

### P1111 IVT CONTROL SOLENOID VALVE

#### Description

Intake valve timing control solenoid valve is activated by ON/OFF pulse duty (ratio) signals from the ECM.

The intake value timing control solenoid value changes the oil amount and direction of flow through intake value timing control unit or stops oil flow.

The longer pulse width advances valve angle.

The shorter pulse width retards valve angle.

When ON and OFF pulse widths become equal, the solenoid valve stops oil pressure flow to fix the intake valve angle at the control position.

### DTC Logic

#### DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1111	Intake valve timing control solenoid valve circuit	An improper voltage is sent to the ECM through intake valve timing control solenoid valve.	<ul> <li>Harness or connectors (Intake valve timing control solenoid valve circuit is open or shorted.)</li> <li>Intake valve timing control solenoid valve</li> </ul>

#### DTC CONFIRMATION PROCEDURE

#### 1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

#### >> GO TO2.

#### 2.PERFORM DTC CONFIRMATION PROCEDURE

- 1. Start engine and let it idle for 5 seconds.
- 2. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-164. "Diagnosis Procedure".

NO >> INSPECTION END

#### Diagnosis Procedure

1. CHECK INTAKE VALVE TIMING CONTROL SOLENOID VALVE POWER SUPPLY CIRCUIT

- 1. Turn ignition switch OFF.
- 2. Disconnect intake valve timing (IVT) control solenoid valve harness connector.
- 3. Turn ignition switch ON.
- 4. Check the voltage between intake valve timing control solenoid valve harness connector and ground.

IVT control se	olenoid valve	Ground	Valtago	
Connector	Terminal	Gibuno	Voltage	
F41	2	Ground	Battery voltage	
Is the inspect	on result nor	mal?	•	
YES >> G	iO TO 3.			
NO >> G	iO TO 2.			
2.DETECT N	MALFUNCTIO	ON PART		

## www.digitalkhodro.com

[MR20DE]



INFOID 00000000489992

INFOID:00000000489992



www.digitalkhodro.com www.digitalkhodro.com P1111 IVT CONTROL SOLENOID VALVE [MR20DE] < COMPONENT DIAGNOSIS > Check the following. Harness connectors E7, F121 А Harness for open or short between intake valve timing control solenoid valve and IPDM E/R EC >> Repair or replace harness or connectors.  ${f 3.}$  CHECK INTAKE VALVE TIMING CONTROL SOLENOID VALVE OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT : С Turn ignition switch OFF. 1. Disconnect ECM harness connector. 2. Check the continuity between intake valve timing control solenoid valve harness connector and ECM har-3. D ness connector. ECM IVT control solenoid valve Continuity Ε Connector Terminal Terminal Connector F41 F8 73 Existed 1 Also check harness for short to ground and short to power. F Is the inspection result normal? YES >> GO TO 4. >> Repair open circuit or short to ground or short to power in harness or connectors. NO G 4.CHECK INTAKE VALVE TIMING CONTROL SOLENOID VALVE Refer to EC-165. "Component Inspection". Н Is the inspection result normal? YES >> GO TO 5. NO >> Replace intake valve timing control solenoid valve. 5. CHECK INTERMITTENT INCIDENT Refer to GI-38, "Intermittent Incident". >> INSPECTION END **Component Inspection** NFOID:0000000048999 К 1. CHECK INTAKE VALVE TIMING CONTROL SOLENOID VALVE-I L 1. Turn ignition switch OFF. Disconnect intake valve timing control solenoid valve harness connector. 2. Check resistance between intake valve timing control solenoid valve terminals as follows. 3. М Terminals Resistance [at 20°C (68°F)] 1 and 2 6.7 - 7.7 Ω N  $\infty \Omega$ 1 or 2 and ground (Continuity should not exist) Is the inspection result normal? 0

YES >> GO TO 2.

NO >> Replace intake valve timing control solenoid valve.

2. CHECK INTAKE VALVE TIMING CONTROL SOLENOID VALVE-II

1. Remove intake valve timing control solenoid valve.

Р

#### P1111 IVT CONTROL SOLENOID VALVE

### www.digitalkhodro.com

#### [MR20DE]

< COMPONENT DIAGNOSIS >
2. Apply 12V between intake valve timing control solenoid valve terminals 1 and 2, and then interrupt it. Make sure that the plunger moves as shown in the figure.
CAUTION:
Do not apply 12V continuously for 5 seconds or more.
Doing so may result in damage to the coil in intake valve timing control solenoid valve.

NOTE:

Always replace O-ring when intake valve timing control solenoid valve is removed.

#### Is the inspection result normal?

- YES >> INSPECTION END
- NO >> Replace intake valve timing control solenoid valve.



# حتضر حمداه

شرکت دیجیتال خودرو سامانه (مسئولیت محدود

### اولین سامانه دیجیتال تعمیر کاران خودر و در ایران

1

a.

•

•

## P1121 ELECTRIC THROTTLE CONTROL ACTUATOR

#### < COMPONENT DIAGNOSIS >

### P1121 ELECTRIC THROTTLE CONTROL ACTUATOR

#### Description

Electric throttle control actuator consists of throttle control motor, throttle position sensor, etc. The throttle control motor is operated by the ECM and it opens and closes the throttle valve. The throttle position sensor detects the throttle valve position, and the opening and closing speed of the throttle valve and feeds the voltage signals to the ECM. The ECM judges the current opening angle of the throttle valve from these signals and the ECM controls the throttle control motor to make the throttle valve opening angle properly in response to driving condition.

### DTC Logic

INFOID:000000004899931

#### DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name		DTC detecting condition	Possible cause
	: Electric throttle control			
P1121 actuator	B)	Throttle valve opening angle in fail-safe mode is not in specified range.	Electric throttle control actuator	
	7	<b>C)</b> .	ECM detect the throttle valve is stuck open.	·
	FIRMATION PROC	EDU	RE	0
	nfirmation Procedure I conds before conduct		een previously conducted, always turn ig e next test.	gnition switch OFF and wait at
بتمحد	بامانه (میبئول		شرکت دیجیتال خود	. 0
•	GO TO 2.		PROCEDURE FOR MALFUNCTION A A	
2. Set shi		1st (N	//T) position and wait at least 3 seconds.	
	ift lever to P (CVT) or inition switch OFF and			
5. Turn ig	nition switch ON and	wait a	at least 1 second.	
	ift lever to D (CVT) or ift lever to P (CVT) or		M/T) position and wait at least 3 seconds.	1
8. Turn ig	nition switch OFF, wa		east 10 seconds, and then turn ON.	
9. Check				· · ·
<u>Is DTC det</u> YES >>	<u>ected?</u> > Go to <u>EC-167, "Diag</u>	noeic	Procedure	
	• GO TO 3.	110515	. <u>Todeudre</u> .	
3.perfo	RM DTC CONFIRMA	TION	PROCEDURE FOR MALFUNCTION C	
	nition switch ON and			
	ift lever to D (CVT) or ift lever to P (CVT) or		M/T) position and wait at least 3 seconds.	•
4. Start e	ngine and let it idle for			
5. Check				
Is DTC det		nonia	Draaadura"	
	> Go to <u>EC-167, "Diag</u> INSPECTION END	HOSIS		
	s Procedure			INFCID:000000004899932
<b>1.</b> снеск		LE C	ONTROL ACTUATOR VISUALLY	· .
			· · · · · · · · · · · · · · · · · · ·	······································

#### EC-167

### 021-62999292

INFOID:000000004899930

#### A

EC

С

D

Ε

62999292



#### om P1122 ELECTRIC THROTTLE CONTROL FUNCTION

#### [MR20DE]

INFOID:000000004899934

INFOID-00000004899935

А

EC

С

D

Е

### P1122 ELECTRIC THROTTLE CONTROL FUNCTION

#### Description

Electric throttle control actuator consists of throttle control motor, throttle position sensor, etc. The throttle control motor is operated by the ECM and it opens and closes the throttle valve. The current opening angle of the throttle valve is detected by the throttle position sensor and it provides feedback to the ECM to control the throttle control motor to make the throttle valve opening angle properly in response to driving condition.

#### DTC Logic

#### DTC DETECTION LOGIC

#### NOTE:

If DTC P1122 is displayed with DTC P1121 or P1126, first perform the trouble diagnosis for DTC P1121 or P1126. Refer to <u>EC-173, "DTC Logic"</u> or <u>EC-167, "DTC Logic"</u>.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1122	Electric throttle control performance	Electric throttle control function does not oper- ate properly.	<ul> <li>Harness or connectors (Throttle control motor circuit is open or shorted)</li> <li>Electric throttle control actuator</li> </ul>
DTC CON	FIRMATION PROCI	EDURE	
1.PRECO	NDITIONING		
least 10 se TESTING (	conds before conduct CONDITION: forming the followin	nas been previously conducted, always ing the next test. g procedure, confirm that battery volt	
	GO TO 2.	اوس سفاله دريقيال ه	
	RM DTC CONFIRMA		
	ngine and let it idle for	wait at least 2 seconds. 5 seconds.	
ls DTC det			
YES >>	<ul> <li>Go to <u>EC-169, "Diag</u></li> <li>INSPECTION END</li> </ul>	nosis Procedure".	
Diagnosi	s Procedure		INFOID:00000004899935
- <b>1.</b> снеск	GROUND CONNECT	ΓΙΟΝ	. 1
	nition switch OFF. ground connection E2	21 and E38. Refer to Ground Inspection	in GI-40, "Circuit Inspection".
· · ·	ection result normal?		
	> GO TO 2. > Repair or replace groups	ound connection	
-	• • •	OL MOTOR RELAY INPUT SIGNAL CIR	
1 Turnin	inition curitob (NV		
	nition switch ON. the voltage between I	ECM hamess connector terminals.	· · ·

# www.digitalkhodro.com www.digitalkhodro.com P1122 ELECTRIC THROTTLE CONTROL FUNCTION

		IAGNOSI	S >			[MR20DE]
				*	•	·
	EC	CM				
+			·····	Condition	Voltage	1
Connector	Terminal	Connector	Terminal			
F7	2	E16	108	Ignition switch: OFF	Approx. 0V	•
				Ignition switch: ON	Battery voitage	
is the insp	-		<u>l?</u>			
	> GO TO > GO TO		•			\$
-					UT SIGNAL CIRCUIT-II	
					OT SIGNAL CINCOLUI	4
		vitch OFF. age betwe	en ECM ł	namess connector	terminals.	:
		- <b>3</b>			· · ·	•
· · · · · · ·	E	СМ				
+				Voltage		i
Connector	Terminal	Connector	Terminal	1		
F7	15	E16	108	Battery voltage	• • ·	
Is the insp	ection re	sult.norma	1?			
	> GO TC					
	> GO TC					
4.CHECH	<b>K THROT</b>	ITLE CON	TROL M	OTOR RELAY PO	WER SUPPLY CIRCUIT	Q
		M harness	s connect	tor.		
<ol><li>Discor</li></ol>						
		DM E/R ha	mess co	nnector.		
			mess co	nnector.	tor and IPDM E/R harness con	nector.
3. Check	the cont	tinuity betv	mess col veen ECI	nnector.	tor and IPDM E/R harness con	nector.
3. Check	the cont	tinuity betv	mess col veen ECI	nnector.	tor and IPDM E/R harness con	nector.
3. Check IPDM Connector	the cont E/R Terminal	tinuity betv EC Connector	rness con veen ECI CM Terminal	nnector. M harness connec Continuity	tor and IPDM E/R harness coni	nector.
3. Check IPDM Connector E12	the cont E/R Terminal 25	tinuity betw EC Connector F7	rness col veen ECI CM Terminal 15	nnector. M harness connec Continuity Existed	اولين سا	nector.
3. Check IPDM Connector E12 4. Also c	the cont E/R Terminal 25 check har	tinuity betw Connector F7 mess for s	rness co veen ECI CM Terminal 15 hort to gr	nnector. M harness connec Continuity	اولين سا	nector.
3. Check IPDM Connector E12 4. Also c Is the insp	E/R Terminal 25 check hai pection re	tinuity betw Connector F7 mess for s sult norma	rness co veen ECI CM Terminal 15 hort to gr	nnector. M harness connec Continuity Existed	اولين سا	nector.
3. Check IPDM Connector E12 4. Also c Is the insp YES >	the cont E/R Terminal 25 check har	tinuity betw Connector F7 mess for s sult norma	rness co veen ECI CM Terminal 15 hort to gr	nnector. M harness connec Continuity Existed	اولين سا	nector.
3. Check IPDM Connector E12 4. Also c Is the insp YES > NO >	E/R Terminal 25 Check har ection re > GO TC > GO TC	tinuity betw Connector F7 mess for s sult norma 0 6. 0 5.	mess col veen ECI Terminal 15 hort to gr 1?	nnector. M harness connec Continuity Existed ound and short to	اولين سا	nector.
3. Check IPDM Connector E12 4. Also c Is the insp YES > NO > 5.DETEC	the cont E/R Terminal 25 check har ection re > GO TC > GO TC CT MALF	tinuity betw Connector F7 mess for s sult norma 6. 5. UNCTION	mess col veen ECI Terminal 15 hort to gr 1?	nnector. M harness connec Continuity Existed ound and short to	اولين سا	nector.
3. Check IPDM Connector E12 4. Also c Is the insp YES > NO > 5.DETEC Check the • Harness	E/R Terminal 25 check hai ection re > GO TC > GO TC CT MALF following connect	tinuity betw Connector F7 mess for s sult norma 0 6. 0 5. UNCTION g. cors E6, F1	mess co veen ECI Terminal 15 hort to gr 1?	nnector. M harness connec Continuity Existed ound and short to	power.	nector.
3. Check IPDM Connector E12 4. Also c Is the insp YES > NO > 5.DETEC Check the • Harness	E/R Terminal 25 check hai ection re > GO TC > GO TC CT MALF following connect	tinuity betw Connector F7 mess for s sult norma 0 6. 0 5. UNCTION g. cors E6, F1	mess co veen ECI Terminal 15 hort to gr 1?	nnector. M harness connec Continuity Existed ound and short to	power.	nector.
3. Check IPDM Connector E12 4. Also c Is the insp YES > NO > 5.DETEC Check the • Harness • Harness	E/R Terminal 25 check har ection re > GO TC > GO TC CT MALF following for oper	tinuity betw Connector F7 mess for s sult norma 0 6. 0 5. CUNCTION g. cors E6, F1 n or short to	Terminal Terminal 15 hort to gr 1? UNG PAF 23 between f	Continuity Existed ound and short to	power.	
3. Check IPDM Connector E12 4. Also c Is the insp YES > NO > 5.DETEC Check the • Harness • Harness	the cont E/R Terminal 25 check har ection re > GO TC > GO TC CT MALF following connect for oper	tinuity betw Connector F7 mess for s sult norma 0 6. 0 5. CUNCTION g. cors E6, F1 n or short to	Terminal Terminal 15 hort to gr 1? UNG PAF 23 between f	Continuity Existed ound and short to	power.	
3. Check IPDM Connector E12 4. Also c Is the insp YES > NO > 5.DETEC Check the • Harness • Harness	the cont E/R Terminal 25 check har ection re > GO TC > GO TC CT MALF following connect for oper	tinuity betw Connector F7 mess for s sult norma 0 6. 0 5. CUNCTION g. cors E6, F1 n or short to	Terminal Terminal 15 hort to gr 1? UNG PAF 23 between f	Continuity Existed ound and short to	power.	
3. Check IPDM Connector E12 4. Also c Is the insp YES > NO > 5.DETEC Check the • Harness • Harness • Harness • Check • Larness	the cont E/R Terminal 25 check har ection re > GO TC CT MALF following connect for oper > Repair K FUSE nnect 15	tinuity betw Connector F7 mess for s sult norma 0 6. 0 5. UNCTION g. ors E6, F1 or short to r open circo A fuse (No	ING PAF 23 24 23 25 25 23 25 23 25 23 25 23 25 25 23 25 25 23 25 25 25 25 25 25 25 25 25 25 25 25 25	Continuity Existed ound and short to	power.	
3. Check IPDM Connector E12 4. Also c Is the insp YES > NO > 5.DETEC Check the • Harness • Harness • Harness • Check 1. Disco 2. Check	the cont E/R Terminal 25 check har ection re > GO TC > GO TC CT MALF following for oper > Repair K FUSE nnect 15 k 15A fus	tinuity betw Connector F7 mess for s sult norma 0 6. 0 5. UNCTION g. ors E6, F1 or short to r open circo A fuse (No	rness colveen ECI Terminal 15 hort to gr 1? IING PAF 23 between f uit or sho 5. 51) from n.	Continuity Existed ound and short to T ECM and IPDM E/	power.	
3. Check IPDM Connector E12 4. Also c Is the insp YES > NO > 5.DETEC Check the • Harness • Harness • Harness • Check • Larness •	the cont E/R Terminal 25 check har ection re > GO TC CT MALF following connect for oper > Repair K FUSE nnect 15 k 15A fus pection re	tinuity betw Connector F7 mess for s sult norma 0 6. 0 5. UNCTION g. ors E6, F1 or short to r open circo A fuse (No se for blow esult norma	rness colveen ECI Terminal 15 hort to gr 1? IING PAF 23 between f uit or sho 5. 51) from n.	Continuity Existed ound and short to T ECM and IPDM E/	power.	
3. Check IPDM Connector E12 4. Also c Is the insp YES > 5.DETEC Check the • Harness • Harness • Harness • Check the • Harness • Check the • Harness • Harness • Check the • Harness •	the cont E/R Terminal 25 check har ection re > GO TC CT MALF following connect for oper > Repair K FUSE nnect 15 k 15A fus pection re > GO TC	Connector F7 Thess for s sult norma 0 6. 0 5. CUNCTION g. fors E6, F1 for short to r open circo A fuse (No se for blow esult norma 0 9.	rness co veen ECI 15 hort to gr 1? IING PAF 23 between f uit or sho 5. 51) fror n. al?	Continuity Existed ound and short to T ECM and IPDM E/	power.	
3. Check IPDM Connector E12 4. Also c Is the insp YES > 5.DETEC Check the • Harness • Harness • Harness • Check 1. Disco 2. Check Is the insp YES > NO > 5.0ETEC 1. Disco 2. Check Is the insp YES > NO > 5.0ETEC	the cont E/R Terminal 25 check har ection re > GO TC > GO TC CT MALF following for oper > Repair K FUSE nnect 15 k 15A fus pection re > GO TC > Replace	tinuity betw Connector F7 mess for s sult norma 0 6. 0 5. UNCTION g. ors E6, F1 or short to r open circo A fuse (No se for blow esult norma 0 9. ce 15A fus	rness colveen ECI Terminal 15 hort to gr 1? IING PAF 23 between f uit or sho 5. 51) fror n. al? e.	Continuity Existed ound and short to T ECM and IPDM E/ ert to ground or sho	power. R port to power in harness connect	
3. Check IPDM Connector E12 4. Also c Is the insp YES > NO > 5.DETEC Check the • Harness • Harness • Harness • Harness • Check 1. Disco 2. Checl Is the insp YES > NO > 7.CHEC	the cont E/R Terminal 25 check har ection re > GO TC > GO TC CT MALF following for oper > Repair K FUSE nnect 15 k 15A fus pection re > GO TC > Replace K THRO	tinuity betw Connector F7 mess for s sult norma 0 6. 0 5. UNCTION g. ors E6, F1 or short t open circo A fuse (No se for blow esuit norma 0 9. ce 15A fus TTLE CON	rness colveen ECI Terminal 15 hort to gr 1? IING PAF 23 between f uit or sho 5. 51) fror n. al? e. ITROL M	Continuity Existed ound and short to T ECM and IPDM E/ ort to ground or sho n IPDM E/R.	power.	
3. Check IPDM Connector E12 4. Also c Is the insp YES > NO > 5.DETEC Check the • Harness • Harness • Harness • Check 1. Disco 2. Checl Is the insp YES > NO = 7.CHEC 1. Disco 1. Disco	the cont E/R Terminal 25 check har ection re > GO TC > GO TC CT MALF following for oper > Repair K FUSE nnect 15 k 15A fus pection re > GO TC > CO TC > Repair K FUSE	tinuity betw Connector F7 mess for s sult norma 0 6. 0 5. UNCTION g. ors E6, F1 or short to r open circo A fuse (No se for blow esult norma 0 9. ce 15A fus	rness colveen ECI Terminal 15 hort to gr 17 11NG PAF 23 between f uit or sho 5. 51) fror n. al? e. ITROL M s connec	Continuity Existed ound and short to T ECM and IPDM E/ ert to ground or sho n IPDM E/R.	power. R port to power in harness connect	
3. Check IPDM Connector E12 4. Also c Is the insp YES > 5.DETEC Check the • Harness • Harness • Harness • Harness • T.CHEC 1. Disco 2. Check Is the insp YES > NO > 5.DETEC 1. Disco 2. Check 1. Disco 2. Check 1. Disco 2. Check 1. Disco 2. Check 1. Disco 2. Disco	the cont E/R Terminal 25 check har ection re > GO TC > GO TC CT MALF following connect for oper > Repair K FUSE nnect 15 k 15A fus pection re > GO TC > GO TC > CO TC	tinuity betw EC Connector F7 mess for s sult norma 0 6. 0 5. CUNCTION 9. cors E6, F1 or short to r open circo A fuse (No se for blow esult norma 0 9. ce 15A fus TTLE CON CM harnes DM E/R ha	rness col veen ECI 15 hort to gr 17 23 between f uit or sho 0. 51) fror n. al? e. ITROL M s connec arness co	Continuity Existed ound and short to T ECM and IPDM E/ ort to ground or sho n IPDM E/R.	power. R port to power in harness connect	ors.
3. Check IPDM Connector E12 4. Also c Is the insp YES > 5.DETEC Check the • Harness • Harness • Harness • Harness • T.CHEC 1. Disco 2. Check Is the insp YES > NO > 5.DETEC 1. Disco 2. Check 1. Disco 2. Check 1. Disco 2. Check 1. Disco 2. Check 1. Disco 2. Disco	the cont E/R Terminal 25 check har ection re > GO TC CT MALF following connect for oper > Repair K FUSE nnect 15 k 15A fus pection re > GO TC > Repair K FUSE nnect 15 k 15A fus pection re > GO TC > Repair K FUSE nnect 15 k 15A fus pection re > GO TC > Repair K FUSE	tinuity betw EC Connector F7 mess for s sult norma 0 6. 0 5. CUNCTION 9. cors E6, F1 or short to r open circo A fuse (No se for blow esult norma 0 9. ce 15A fus TTLE CON CM harnes DM E/R ha	rness col veen ECI 15 hort to gr 17 23 between f uit or sho 0. 51) fror n. al? e. ITROL M s connec arness co	Continuity Existed ound and short to T ECM and IPDM E/ ort to ground or sho n IPDM E/R.	power. R ort to power in harness connect PUT SIGNAL CIRCUIT-II ctor and IPDM E/R harness con	ors.

## www.digitalkhodro.com www.digitalkhodro.com P1122 ELECTRIC THROTTLE CONTROL FUNCTION

IPDM		EC	T	Continuit	ity	
Connector	Terminal	Connector		Į		
E12	32	F7	2	Existed		ĺ
			-	ound and	d short to power.	
-	> GO TO	<u>sult_norma</u> o o	<u>U f</u>			
	> GO TO					
.DETEC		UNCTION	ING PAR	т		
neck the	following	1.			· · · · · · · · · · · · · · · · · · ·	_
Harness	connecto	ors E7, F1				
Harness	tor open	or short b	etween E	CM and	IPDM E/R	
~ ~	Ronair	onen circi	lit or ebo	rt to arou	und or short to power in harness connectors.	
	•	MITTENT I		. 🖛		
		ermittent li		•	· · · · · · · · · · · · · · · · · · ·	_
		sult norma			:	
		e IPDM E				
		or replace		or conne	nectors.	
0.CHEC		OTTLE CO	NTROL	MOTOR	OUTPUT SIGNAL CIRCUIT FOR OPEN OR SHORT	
		vitch OFF.				-
Discon	nect ele	ctric thrott	le contro	l actuator	or harness connector.	
Discon Discon	nect ele nect EC	ctric thrott M harness	le contro s connect	l actuator tor.	or harness connector.	
Discon Discon	nect ele nect EC the cont	ctric thrott M harness	le contro s connect	l actuator tor.		1-
Discon Discon Check nector.	nect ele nect EC the cont	ctric thrott M harness tinuity betw	le contro s connect ween ele	l actuator tor. ctric throt	or harness connector.	<u>-</u> 1-
Discon Discon Check nector.	nnect ele nnect EC the cont	ctric thrott M harness tinuity betw	le control s connect ween ele ECI	l actuator tor. ctric throt	or harness connector.	<u>-</u> 1-
Discon Discon Check nector.	nnect ele nnect EC the cont	ctric thrott M harness tinuity betw	le contro s connect ween ele	l actuator tor. ctric throt M Terminal	or harness connector. ottle control actuator harness connector and ECM harness con Continuity	n-
Discon Discon Check nector.	nnect ele nnect EC the cont	ctric thrott M harness tinuity betw	le control s connect ween ele ECI	l actuator tor. ctric throt M Terminal 1	or harness connector. Dottle control actuator harness connector and ECM harness con Continuity Not existed	n-
Discon Discon Check nector.	nnect ele nnect EC the cont	ctric thrott M harness tinuity betw actuator erminal C	le control s connect ween ele ECI	l actuator tor. ctric throt M Terminal	or harness connector. ottle control actuator harness connector and ECM harness con Continuity Not existed Existed	1-
Discon Discon Check nector.	nnect ele nnect EC the cont	ctric thrott M harness tinuity betw actuator erminal C	le contro s connect ween ele EC	l actuator tor. ctric throt M Terminal 1 4 1	or harness connector. Dottle control actuator harness connector and ECM harness con Continuity Not existed Existed Existed	)-
Discon Discon Check nector. Electric thro Connecto	the control or Te	ctric thrott M harness tinuity betw actuator crminal 5 6	le control s connect ween ele ECI Connector F7	l actuator tor. ctric throt <u>Terminal</u> 1 4 1 4	or harness connector. Dottle control actuator harness connector and ECM harness con Continuity Not existed Existed Not existed Not existed	]-
Discon Discon Check nector. Electric thro Connecto F29 Also ch	the control or Te	ctric thrott M harness tinuity betw actuator 5 6 6 ness for sl	le control s connect ween ele ECI Connector F7	l actuator tor. ctric throt <u>Terminal</u> 1 4 1 4	or harness connector. Dottle control actuator harness connector and ECM harness con Continuity Not existed Existed Existed	)-
Discon Discon Check nector. Electric thro Connecto F29 Also ch the inspe	heck har	ctric thrott M harness tinuity betw actuator 5 6 6 ness for sl sult norma	le control s connect ween ele ECI Connector F7	l actuator tor. ctric throt <u>Terminal</u> 1 4 1 4	or harness connector. Dottle control actuator harness connector and ECM harness con Continuity Not existed Existed Not existed Not existed	1-
Discon Discon Check nector. Electric thro Connecto F29 Also ch the inspe YES >>	heck han ection res	ctric thrott M harness tinuity betw actuator 5 6 6 ness for sl sult norma	ECI Connector F7 hort to gr	A actuator tor. ctric throt Terminal 1 4 1 4 0 und and	or harness connector. Ottle control actuator harness connector and ECM harness con Continuity Not existed Existed Existed Not existed Not existed Not existed Not existed Not existed Not existed	)-
Discon Discon Check nector. Electric thro Connecto F29 Also ch the inspe YES >> NO >>	heck har ection rei GO TO > Repair	ctric thrott M harness tinuity betw actuator 5 6 6 ness for sl sult norma 0 11. or replace	le control s connect ween ele ECI Connector F7 F7 hort to gr al?	A actuator tor. ctric throt Terminal 1 4 1 4 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	or harness connector. Ottle control actuator harness connector and ECM harness con Continuity Not existed Existed Existed Not existed Not existed Not existed Not existed Not existed Not existed	)-
Discon Discon Check nector. Electric thro Connecto F29 Also ch the inspective YES >> NO >> <b>1.</b> CHEC	heck har ection rei GO TO > Repair CK ELEC	ctric thrott M harness tinuity betw actuator 5 6 6 ness for sl sult norma 0 11. or replace	le control s connect ween ele ECI Connector F7 F7 hort to gr al? harness ROTTLE	A actuator tor. ctric throt Terminal 1 4 1 4 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	Continuity Not existed Existed Existed Not existed d short to power.	)- -
Discon Discon Check nector. Electric thro Connecto F29 Also ch the inspective YES >====================================	heck har ection res GO TO Repair CK ELEC	ctric thrott M harness tinuity betw actuator 5 6 6 5 6 6 11. or replace TRIC THF take air du n matter is	ECC Connector F7 F7 hort to gr 12 harness ROTTLE	A ctuator tor. ctric throf M Terminal 1 4 1 4 ound and 6 or conne CONTRC	Continuity Not existed Existed Existed Not existed d short to power.	
Discon Discon Check nector. Electric thro Connecto F29 Also ch the inspective YES >====================================	heck har ection res GO TO Repair CK ELEC	ctric thrott M harness tinuity betw actuator 5 6 6 5 6 6 11. or replace TRIC THF take air du n matter is	ECC Connector F7 F7 hort to gr 12 harness ROTTLE	A ctuator tor. ctric throf M Terminal 1 4 1 4 ound and 6 or conne CONTRC	Continuity Not existed Existed Existed Not existed d short to power.	
Discon Discon Check nector. Electric thro Connecto F29 Also ch the inspective YES >====================================	heck har ection res GO TO Repair CK ELEC ve the int if foreig e housin	ctric thrott M harness tinuity betw actuator 5 6 6 5 6 6 11. or replace TRIC THF take air du n matter is	le control s connector ECI Connector F7 F7 hort to gr l? hort to gr l? charness ROTTLE s caught	A ctuator tor. ctric throf M Terminal 1 4 1 4 ound and 6 or conne CONTRC	Continuity Not existed Existed Existed Not existed d short to power.	
Discon Discon Check nector. Electric thro Connecto F29 Also ch the inspective YES >3 NO >3 1.CHEC Remov Check and the 2.	heck har ection res GO TO Repair CK ELEC ve the inf if foreig e housin	ctric thrott M harness tinuity betw arminal C 5 6 6 9 11. 0 replace TRIC THF take air du n matter is 9 throttle control	le control s connector ECI Connector F7 F7 hort to gr 1? hort to gr 1? hort to gr 1? charness ROTTLE s caught ol actuator	A ctuator tor. ctric throf M Terminal 1 4 1 4 ound and 6 or conne CONTRC	Continuity Not existed Existed Existed Not existed d short to power.	
Discon Discon Check nector. Electric thro Connecto F29 Also ch the inspective YES >> NO >> <b>1.</b> CHEC Remov Check and the 2. the inspective the inspective Check	heck har ection res GO TO Repair CK ELEC ve the inf if foreig e housin	ctric thrott M harness tinuity betw arminal C 5 6 6 ness for sl sult norma 0 11. or replace TRIC THF take air du n matter is 9 throttle contra	le control s connector ECI Connector F7 F7 hort to gr 1? hort to gr 1? hort to gr 1? charness ROTTLE s caught ol actuator	A ctuator tor. ctric throf M Terminal 1 4 1 4 ound and 6 or conne CONTRC	Continuity Not existed Existed Existed Not existed d short to power.	
Discon Discon Check nector. Electric thro Connecto F29 Also ch the inspe YES >> 1.CHEC Remov Check and the 2. the inspe YES >>	heck har ection reige block ELEC > GO TO > Repair CK ELEC ve the inf if foreig e housin Electric foreig > GO TO > Repair	ctric thrott M harness tinuity betw actuator factuator f f f f f f f f f f f f f f f f f f f	le control s connector ECI Connector F7 F7 hort to gr l? hort to gr l? hort to gr l? charness ROTTLE ict. s caught ol actuator l? ign matte	A actuator tor. ctric throt Terminal 1 4 1 4 ound and content CONTRC	Continuity Not existed Existed Existed Not existed d short to power.	
Discon Discon Check nector. Electric thro Connecto F29 Also ch the inspe YES >> 1.CHEC Remov Check and the 2. the inspe YES >>	heck har ection reige block ELEC > GO TO > Repair CK ELEC ve the inf if foreig e housin Electric foreig > GO TO > Repair	ctric thrott M harness tinuity betw arminal C 5 6 6 ness for sl sult norma 11. or replace TRIC THF take air du n matter is 9 throttle contro sult norma 9 12.	le control s connector ECI Connector F7 F7 hort to gr l? hort to gr l? hort to gr l? charness ROTTLE ict. s caught ol actuator l? ign matte	A actuator tor. ctric throt Terminal 1 4 1 4 ound and content CONTRC	Continuity Not existed Existed Existed Not existed d short to power.	

#### 

ę,

ſ

<pre>P1122 ELECTRIC THROTTLE CONTROL FUNCTION &lt; COMPONENT DIAGNOSIS &gt;</pre>	[MR20DE]
Refer to EC-172, "Component Inspection".	
Is the inspection result normal?	ľ
YES >> GO TO 13.	•
NO >> GO TO 14.	
13.CHECK INTERMITTENT INCIDENT	t
Refer to GI-38, "Intermittent Incident".	k
Is the inspection result normal?	
YES >> GO TO 14. NO >> Repair or replace harness or connectors.	
14.REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR	1.
<ol> <li>Replace malfunction electric throttle control actuator.</li> <li>Go to EC-172. "Special Repair Requirement".</li> </ol>	
2. do to <u>co-172. opecial negal negal negal negal enterne</u> .	1
>> INSPECTION END	:
Component Inspection	j.
	INFOID:00000000489993
1. CHECK THROTTLE CONTROL MOTOR	
1. Disconnect electric throttle control actuator harness connector.	······································
2. Check resistance between electric throttle control actuator terminals as follows.	i
Terminals Resistance	:
5 and 6 Approx. 1 - 15 Ω [at 25 °C (77°F)]	
Is the inspection result normal?	
YES >> INSPECTION END NO >> GO TO 2.	
2.REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR	
1. Replace electric throttle control actuator.	. 1
2. Go to <u>EC-172, "Special Repair Requirement"</u> .	
· · ·	
>> INSPECTION END	· 1
Special Repair Requirement	INFOID:0000000048999
4	
1.PERFORM THROTTLE VALVE CLOSED POSITION LEARNING	
Refer to EC-15. "THROTTLE VALVE CLOSED POSITION LEARNING : Special Repair Requ	<u>iirement"</u>
	ļ
>> GO TO 2.	· .
2.PERFORM IDLE AIR VOLUME LEARNING	1
Refer to EC-15. "IDLE AIR VOLUME LEARNING : Special Repair Requirement"	•
	·
>> END	
	۴
	1
	1

#### www.digitalkhodro.com P1124, P1126 THROTTLE CONTROL MOTOR RELAY

#### < COMPONENT DIAGNOSIS >

### P1124, P1126 THROTTLE CONTROL MOTOR RELAY

#### Description

Power supply for the throttle control motor is provided to the ECM via throttle control motor relay. The throttle control motor relay is ON/OFF controlled by the ECM. When the ignition switch is turned ON, the ECM sends an ON signal to throttle control motor relay and battery voltage is provided to the ECM. When the ignition switch is turned OFF, the ECM sends an OFF signal to throttle control motor relay and battery voltage is not provided to the ECM.

#### **DTC** Logic

D

A

EC

С

#### DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1124	Throttle control motor relay circuit short	ECM detect the throttle control motor relay is stuck ON.	<ul> <li>Harness or connectors (Throttle control motor relay circuit is shorted)</li> <li>Throttle control motor relay</li> </ul>
P1126	Throttle control motor relay circuit open	ECM detects a voltage of power source for throttle control motor is excessively low.	<ul> <li>Harness or connectors         <ul> <li>(Throttle control motor relay circuit is open)</li> <li>Throttle control motor relay</li> <li>(Throttle control motor relay</li> <li>(Throttle control motor relay)</li> </ul> </li> </ul>
	FIRMATION PROCI	EDURE	a 0
ieast 10 sec TESTING C	conds before conduct	nas been previously conducted, always ing the next test. g procedure, confirm that battery vo	
Witch DTC P1124 >>	is detected? GO TO 2. GO TO 3.	اولین سامانه دیجیتال تع	
2.PERFOR	RM DTC CONFIRMA	TION PROCEDURE FOR DTC P1124	
2. Check is DTC dete	DTC.	wait at least 1 second.	
	INSPECTION END	nosis riocedure.	
<b>3.</b> PERFOR	RM DTC CONFIRMA	TION PROCEDURE FOR DTC P1126	· · · · · · · · · · · · · · · · · · ·
	ngine and let it idle for	wait at least 2 seconds. 5 seconds.	
Is DTC dete			
	Go to EC-173. "Diag INSPECTION END	nosis Procedure".	
Diagnosi	s Procedure		INFCID:000000004899941
<b>1.</b> CHECK	THROTTLE CONTRO	OL MOTOR RELAY INPUT SIGNAL CI	RCUIT-I
	nition switch OFF.		
		ECM harness connector terminals.	, , , , , , , , , , , , , , , , , , ,
			. · · ·

#### 021-62999292

## [MR20DE]

INFOID:000000004899939

INFOID-00000004899940

021-629992

# www.digitalkhodro.com P1124, P1126 THROTTLE CONTROL MOTOR RELAY

www didital	khodro.com

	E7	<u>.</u> М					1
+ ECM			Vala		4		
+ Connector	Terminal	Connector	Terminal	Voltage			:
F7		E16	108	Battery voltage		• .	
		sult normal					i
•	> GO TO		<u>{</u>	:			•
	> GO TO						
2.CHECH	K THROT	TLE CON	TROL MO	OTOR RELAY POW	VER SUPPLY CI	RCUIT	ŀ
		M harness					· · · · · · · · · · · · · · · · · · ·
2. Disco	nnect IPD	M E/R har	ness cor	nnector.		:	
3. Check	the cont	inuity betw	een ECN	A harness connect	or and IPDM E/R	hamess connec	ctor.
IPDM	E/D	EC	M				,
Connector	Terminal	Connector	Terminal	Continuity			
E12	25	F7	15	Existed			1 · · ·
	I		i	ound and short to p	ower		
		sult normal	-		,		
•	> GO TO						
NO >	> GO TO	3.					1'
3.DETEC	CT MALF	UNCTIONI	NG PAR	т			
Check the							
Harness	connecto	ors E6, F12					· i
Harness	connecto	ors E6, F12		CM and IPDM E/F	ان در میں	$\sim$	i i
<ul><li>Harness</li><li>Harness</li></ul>	for open	ors E6, F12 or short be	etween E	یجیتال حود	شردت در		
Harness Harness	connecto for open	ors E6, F12 or short be	etween E	ECM and IPDM E/F	شردت در	ness connectors	3
Harness Harness 4.CHEC	<ul> <li>connector</li> <li>for open</li> <li>&gt; Repair</li> <li>&lt; FUSE</li> </ul>	ors E6, F12 or short be	etween E lit or sho	rt to ground or sho	شردت در	ness connectors	3.
Harness Harness 4.CHEC 1. Disco	<ul> <li>connector</li> <li>for open</li> <li>&gt; Repair</li> <li>&lt; FUSE</li> <li>nnect 15/</li> </ul>	ors E6, F12 or short be open circu A fuse (No.	etween E lit or shor . 51) from	یجیتال حود	شردت در	ness connectors	5.
Harness Harness 4.CHEC 1. Disco 2. Chec	<ul> <li>connector</li> <li>for open</li> <li>Repair</li> <li>FUSE</li> <li>nnect 15/</li> <li>15A fus</li> </ul>	ors E6, F12 or short be open circu A fuse (No. e for blowr	etween E hit or shor . 51) from h.	rt to ground or sho	شردت در	ness connectors	₽ 3.
Harness Harness 4.CHEC 1. Disco 2. Check Is the insp	<ul> <li>connector</li> <li>for open</li> <li>Repair</li> <li>FUSE</li> <li>nnect 15/</li> <li>15A fus</li> </ul>	open circu open circu A fuse (No. e for blowr sult norma	etween E hit or shor . 51) from h.	rt to ground or sho	شردت در	ness connectors	S.
Harness Harness 4.CHEC 1. Disco 2. Chec Is the insp YES > NO >	<ul> <li>connector</li> <li>for open</li> <li>Repair</li> <li>FUSE</li> <li>nnect 15/</li> <li>15A fusion</li> <li>GO TC</li> <li>Replace</li> </ul>	open circu open circu A fuse (No. e for blowr sult norma ) 8. e 15A fuse	etween E it or shor . 51) from !?	n IPDM E/R.	nt to power in har		3. · · ·
Harness Harness 4.CHEC 1. Disco 2. Chec Is the insp YES > NO >	<ul> <li>connector</li> <li>for open</li> <li>Repair</li> <li>FUSE</li> <li>nnect 15/</li> <li>15A fusion</li> <li>GO TC</li> <li>Replace</li> </ul>	open circu open circu A fuse (No. e for blowr sult norma ) 8. e 15A fuse	etween E it or shor . 51) from !?	rt to ground or sho	nt to power in har		
Harness Harness 4.CHEC 1. Disco 2. Chec Is the insp YES NO 5.CHEC	<ul> <li>connect</li> <li>for open</li> <li>Repair</li> <li>FUSE</li> <li>nnect 15/</li> <li>15A fus</li> <li>ection re</li> <li>&gt; GO TC</li> <li>&gt; Replac</li> <li>K THROT</li> </ul>	ors E6, F12 or short be open circu A fuse (No. e for blowr sult norma ) 8. e 15A fuse TLE CON	etween E it or shore . 51) from	n IPDM E/R.	t to power in har		5.
Harness Harness 4.CHEC 1. Disco 2. Chec Is the insp YES NO 5.CHEC	<ul> <li>connector</li> <li>for open</li> <li>Repair</li> <li>FUSE</li> <li>nnect 15/</li> <li>15A fusion</li> <li>GO TC</li> <li>Replace</li> <li>K THROT</li> <li>k the volta</li> </ul>	open circu open circu A fuse (No. e for blowr sult norma ) 8. e 15A fuse TLE CON age betwee	etween E it or shore . 51) from	n IPDM E/R.	t to power in har		5.
Harness Harness 4.CHEC 1. Disco 2. Chec Is the insp YES NO 5.CHEC	<ul> <li>connector</li> <li>for open</li> <li>Repair</li> <li>FUSE</li> <li>nnect 15/</li> <li>15A fusion</li> <li>GO TC</li> <li>Replace</li> <li>K THROT</li> <li>k the volta</li> </ul>	ors E6, F12 or short be open circu A fuse (No. e for blowr sult norma ) 8. e 15A fuse TLE CON	etween E it or shore . 51) from	n IPDM E/R.	UT SIGNAL CIRe terminals.		
Harness Harness <b>4.</b> CHEC 1. Disco 2. Chec Is the insp YES NO <b>5.</b> CHEC 1. Chec	<ul> <li>connector</li> <li>for open</li> <li>Repair</li> <li>FUSE</li> <li>nnect 15/</li> <li>15A fus</li> <li>ection replace</li> <li>GO TC</li> <li>Replace</li> <li>K THROT</li> <li>k the volta</li> </ul>	open circu open circu A fuse (No. e for blowr sult norma ) 8. e 15A fuse TLE CON age betwee	etween E it or shore . 51) from	n IPDM E/R.	t to power in har		5.
Harness Harness <b>4.</b> CHEC 1. Disco 2. Chec ls the insp YES > NO > <b>5.</b> CHEC 1. Chec	<ul> <li>connector</li> <li>for open</li> <li>Repair</li> <li>FUSE</li> <li>nnect 15/</li> <li>15A fus</li> <li>ection replace</li> <li>GO TC</li> <li>Replace</li> <li>K THROT</li> <li>k the volta</li> </ul>	open circu open circu A fuse (No. e for blowr sult norma ) 8. e 15A fuse TLE CON age betwee	etween E it or shore . 51) from	n IPDM E/R.	UT SIGNAL CIRe terminals.		
Harness Harness <b>4.</b> CHEC 1. Disco 2. Chec Is the insp YES NO <b>5.</b> CHEC 1. Chec	<ul> <li>connector</li> <li>for open</li> <li>Repair</li> <li>FUSE</li> <li>nnect 15/</li> <li>15A fus</li> <li>ection replace</li> <li>GO TC</li> <li>Replace</li> <li>K THROT</li> <li>k the volta</li> </ul>	ors E6, F12 or short be open circu A fuse (No. e for blowr sult norma 0 8. ce 15A fuse TLE CON age betwee	etween E it or shore . 51) from	n IPDM E/R.	UT SIGNAL CIRe terminals.		
Harness Harness Harness Harness Harness Harness Harness Harness S.CHEC	connector for open Repair FUSE nnect 15/ 15A fus ection report GO TC GO TC Control of the control	ors E6, F12 or short be open circu A fuse (No. e for blowr sult norma ) 8. ce 15A fuse TLE CON age betwee CM Connector E16	etween E it or shore . 51) from !? - TROL M e. TROL M Terminal 108	n IPDM E/R.	UT SIGNAL CIRe terminals.		
Harness Harness Harness Harness Harness Harness Harness Harness Stepping Harness Harne	connector for open Repair FUSE nnect 15/ 15A fusion reprised to the section reprised to the sec	ors E6, F12 or short be open circu A fuse (No. e for blowr sult norma 0 8. ce 15A fuse TLE CON age betwee CM Connector E16 sult norma	etween E it or shore . 51) from !? - TROL M e. TROL M Terminal 108	n IPDM E/R.	UT SIGNAL CIRe terminals.		
Harness Harnes	connector for open Repair FUSE nnect 15/ 15A fus ection replace GO TC Replace K THROT k the volta Equation replace Section replace a control open a	ors E6, F12 or short be open circu A fuse (No. e for blowr sult norma 8. ce 15A fuse TLE CON age betwee CM Connector E16 sult norma 0 8.	etween E it or shore . 51) from !? - TROL M e. TROL M Terminal 108	n IPDM E/R.	UT SIGNAL CIRe terminals.		
Harness Harness Harness Harness Harness Harness Harness Harness Connector F7 Hs the insp YES YES YES YES NO S	connector for open Repair FUSE nnect 15/ 15A fus ection report GO TO Replace K THROT k the volta Eetion report S GO TO	ors E6, F12 or short be open circu A fuse (No. e for blowr sult norma ) 8. ce 15A fuse TLE CON age betwee CM Connector E16 sult norma 0 8. 0 6.	etween E it or shore . 51) from !? - TROL M P TROL M I P Terminal 108	t to ground or shown IPDM E/R. OTOR RELAY INP harness connector Condition Ignition switch: OFF Ignition switch: ON	UT SIGNAL CIRC terminals.	CUIT-I	
Harness Harness Harness Harness Harness Harness Harness Harness Connector F7 Is the insr YES NO S Connector F7 Is the insr YES S O CONNECT	connector for open Repair FUSE nnect 15/ 15A fus ection reprised to the volta Fusion the volta Fusion reprised to the volt	open circu open circu A fuse (No. e for blowr sult norma ) 8. ce 15A fuse TLE CON age betwee CM Connector E16 sult norma ) 8. CM Connector E16	etween E it or shore . 51) from !? - TROL M P TROL M I P Terminal 108	n IPDM E/R.	UT SIGNAL CIRC terminals.	CUIT-I	
Harness Harness Harness Harness Harness Harness Harness Harness Check I. Disco Connector F7 Is the insr YES NO Connector F7 Is the insr YES NO Connector I. Turn	Connector for open Sepair CFUSE nnect 15/ CFUSE nnect 15/ CFUSE Nnect 15/ CFUSE Nnect 15/ CFUSE Section rest CFUSE Section rest CFUSE Section rest CFUSE Section rest Section rest Section rest Section rest Section rest CFUSE Section rest Section rest	open circu open circu A fuse (No. e for blowr sult norma ) 8. ce 15A fuse TLE CON age betwee CM Connector E16 sult norma ) 8. CM Connector E16 sult norma ) 8. CM	etween E it or shore . 51) from	T IPDM E/R. OTOR RELAY INP harness connector Condition Ignition switch: OFF Ignition switch: ON	UT SIGNAL CIRC terminals.	CUIT-I	
Harness Harness Harness Harness Harness Harness Harness Harness 4.CHEC	Connector for open > Repair < FUSE nnect 15/ < 15A fus ection repair > GO TC > GO TC	open circu open circu A fuse (No. e for blowr sult norma ) 8. ce 15A fuse TLE CON age betwee CM Connector E16 sult norma ) 8. CM Connector E16	etween E it or short 51) from 51) from TROL M Terminal 108 I? TROL M s connec	t to ground or shown IPDM E/R. OTOR RELAY INP harness connector Condition Ignition switch: OFF Ignition switch: ON OTOR RELAY INP tor.	UT SIGNAL CIRC terminals.	CUIT-I	

•

.

# www.digitalkhodro.com www.digitalkhodro.com P1124, P1126 THROTTLE CONTROL MOTOR RELAY

< COMPONEN	NT DIAGNOSI	S >		·	[MR20DE]	
		<b>_</b>	•	. *		
IPDM E/R	EC	Continuity			¥	
	ninal Connector	Terminal			i	
	32 F7	2 Existed	· ·	4	8	E
		nort to ground and sh	ort to power.	7		
	on result norma D TO 8.	<u>1 /</u>			ı	
	D TO 7.					
7.DETECT M	ALFUNCTION	NG PART			i	
Check the follo	wing.			· · · .		
<ul> <li>Harness con</li> </ul>	nectors E7, F1	21 atwaan ECM and IBE			:	
• namess for d	open or short of	etween ECM and IPE			, i	
>> Re	epair open circu	it or short to around (	or short to power in har	ness connectors.		
-	ERMITTENT I	-	••••••			
<u> </u>	"Intermittent Ir	•	······································			•
	n result norma			· .	2 1	
YES >> Re	place IPDM E/	'R.			₽ ₽	
NO >> Re	epair or replace	harness or connecto	rs.	•	ŧ	
Terror In		نال خودر و ساه		1		
ويت محدر						
1.1						
ארנה הרודות		•ديجيتال تعم	اوس سامات	0		
					\$	
. ÷					3	
ţ.	•				Naret-	
-					ł	
				+	-	
				· .	t	
					<b>*</b> -	
			· · · ·		1 1 1	
١					• •	
4. -				•	· i	
4			<b>.</b> .	14 - C	т	
			•		i F	
				•	) )	
					,	
				•	•	
2000000		-	EC-175	~	004 6000	ഹ
62999292		i i	C-170		021-6299	19

### P1128 THROTTLE CONTROL MOTOR

#### < COMPONENT DIAGNOSIS >

### P1128 THROTTLE CONTROL MOTOR

#### Description

The throttle control motor is operated by the ECM and it opens and closes the throttle valve. The current opening angle of the throttle valve is detected by the throttle position sensor and it provides feedback to the ECM to control the throttle control motor to make the throttle valve opening angle properly in response to driving condition.

#### **DTC Logic**

INFOID:000000004899943

#### DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause		
P1128	Throttle control motor circuit short	ECM detects short in both circuits between ECM and throttle control motor.	<ul> <li>Harness or connectors (Throttle control motor circuit is shorted.)</li> <li>Electric throttle control actuator (Throttle control motor)</li> </ul>		

#### DTC CONFIRMATION PROCEDURE

#### **1**.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

#### >> GO TO 2.

#### 2. PERFORM DTC CONFIRMATION PROCEDURE

- 1. Turn ignition switch ON and wait at least 2 seconds.
- 2. Start engine and let it idle for 5 seconds.
- 3. Check DTC.

#### Is DTC detected?

- YES >> Go to EC-176. "Diagnosis Procedure".
- NO >> INSPECTION END

#### **Diagnosis** Procedure

INFOID:000000004899944

- **1.**CHECK GROUND CONNECTION
- 1. Turn ignition switch OFF.
- 2. Check ground connection E21 and E38. Refer to Ground Inspection in <u>GI-40. "Circuit Inspection"</u>. Is the inspection result normal?
- YES >> GO TO 2.
- NO >> Repair or replace ground connection.

 $\mathbf{2}.$ CHECK THROTTLE CONTROL MOTOR OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

- 1. Disconnect electric throttle control actuator harness connector.
- 2. Disconnect ECM hamess connector.
- Check the continuity between electric throttle control actuator harness connector and ECM harness connector.

Electric throttle c	ontrol actuator	EC	Continuity	
Connector	Terminal	Connector	Terminal	Continuity
	5		1	Not existed
F29		F7	4	Existed
F29			1	Existed
	6		4	Not existed

### 021-62999292

www.digitalkhodro.com

[MR20DE]

INFOID:00000004899942

## P1128 THROTTLE CONTROL MOTOR

www.digitalkhodro.com

< COMPONENT DIAGNOSIS > [MR20DE]	
4. Also check harness for short to ground and short to power.	
Is the inspection result normal?	A
YES >> GO TO 3. NO >> Repair or replace hamess or connectors.	
3. CHECK THROTTLE CONTROL MOTOR	EC
Refer to EC-177, "Component Inspection".	
Is the inspection result normal?	с
YES >> GO TO 4.	
NO >> GO TO 5.	
	D
Refer to GI-38, "Intermittent Incident".	1
Is the inspection result normal?	E '
YES >> GO TO 5. NO >> Repair or replace harness or connectors.	
5. REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR	_ 1
1. Replace electric throttle control actuator.	F
2. Go to <u>EC-177, "Special Repair Requirement"</u> .	
	G
>> INSPECTION END	ľ
Component Inspection	Н,
1. CHECK THROTTLE CONTROL MOTOR	
1. Disconnect electric throttle control actuator harness connector.	
2. Check resistance between electric throttle control actuator terminals as follows.	
	ļ
Terminals Resistance	J
5 and 6 Approx. 1 - 15 Ω [at 25 °C (77°F)]	ļ
Is the inspection result normal? YES >> INSPECTION END	K I
NO $>>$ GO TO 2.	ł
2. REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR	1
1. Replace electric throttle control actuator.	
2. Go to EC-177. "Special Repair Requirement".	•
	M .
>> INSPECTION END	ļ
Special Repair Requirement	N.
1.PERFORM THROTTLE VALVE CLOSED POSITION LEARNING	. 1
Refer to EC-15, "THROTTLE VALVE CLOSED POSITION LEARNING : Special Repair Requirement"	
	0
>> GO TO 2.	
2. PERFORM IDLE AIR VOLUME LEARNING	P,
Refer to EC-15, "IDLE AIR VOLUME LEARNING : Special Repair Requirement"	
<b>!</b>	•
>> END	I
	:

P1143 HO2S1

#### < COMPONENT DIAGNOSIS >

#### P1143 HO2S1

#### Description

The heated oxygen sensor 1 is placed into the exhaust manifold. It detects the amount of oxygen in the exhaust gas compared to the outside air. The heated oxygen sensor 1 has a closed-end tube made of ceramic zirconia. The zirconia generates voltage from approximately 1V in richer conditions to 0V in leaner conditions. The heated oxygen sensor 1 signal is sent to the ECM. The ECM adjusts the injection pulse duration to achieve the ideal air-fuel ratio. The ideal air-fuel ratio occurs near the radical change from 1V to 0V.



### شرکت دیجیتال خودر و سامانه (مسرکت

#### DTC DETECTION LOGIC

To judge the malfunction, the output from the heated oxygen sensor 1 is monitored to determine whether the "rich" output is sufficiently high and whether the "lean" output is sufficiently low. When both the outputs are shifting to the lean side, the malfunction will be detected.



DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1143	Heated oxygen sensor 1 lean shift monitoring	The maximum and minimum voltage from the sensor are not reached to the specified voltages.	<ul> <li>Heated oxygen sensor 1</li> <li>Heated oxygen sensor 1 heater</li> <li>Fuel pressure</li> <li>Fuel injector</li> <li>Intake air leaks</li> </ul>

Component Function Check

#### **1.**PERFORM COMPONENT FUNCTION CHECK

1. Start engine and warm it up to normal operating temperature.

2. Check the voltage between ECM harness connector terminals.

[MR20DE]

INFOID-000000004899947

Louver

INFOID:0000000004899944

www.digitalkhodro.com

#### EC-178

021-62999292

INFOID:000000004899

P1143 HO2S1

www.digitalkhodro.com

#### < COMPONENT DIAGNOSIS >

[MR20DE]

021-62999292

ECM					
Connector + -		Condition	Voltage		
	Terminal	Terminal			.
F8 .	49 (HO2S1 signal)	56	Engine speed held at 2,000 rpm constant under no load.	<ul> <li>The maximum voltage is over 0.6 V at least 1 time.</li> <li>The minimum voltage is over 0.1 V at least 1 time.</li> </ul>	
,	on result normal				
	SPECTION EN		Procedure		
•	to <u>EC-109, "D</u>	IAUNUSIS F	TOCEUDIE.		
· •	Procedure			INFC/ID;000000004899956	,
				· · · · · · · · · · · · · · · · · · ·	
	on switch OFF.	E21 and	E38 Befer to Ground In	spection in GI-40, "Circuit Inspection".	
-	n result normal			spection in <u>carao, oncontraspection</u> .	
-	D TO 2.				
	epair or replace	-		•	
RETIGHTE	N HEATED OX	YGEN SE	NSOR 1		_
osen and re	tighten heated o	oxygen se	nsor 1. Refer to EM-151	"Removal and Installation".	
	D TO 3. E SELF-LEARN				
:					
	iure ratio self-l Special Repair F		alue, refer to <u>EC-16. "</u>	MIXTURE RATIO SELF-LEARNING VALUE	
			111		
	e for at least 10			ا ا ا ا ا ا ا ا ا ا ا ا ا ا ا ا ا ا ا	
Run engin	e for at least 10	minutes a	at idle speed.		
Run engin he 1st trip D	e for at least 10 DTC P0171 dete	minutes a	at idle speed. fficult to start engine?		
Run engin he 1st trip [ es >> Pe	e for at least 10 DTC P0171 dete	minutes a	at idle speed.	۵۱۵ <u>EC-129, "DTC Logic"</u> .	
Run engin he 1st trip E es >> Pe o >> G	e for at least 10 DTC P0171 dete erform trouble d	ected or di iagnosis fo	at idle speed. fficult to start engine? or DTC P0171. Refer to	۵۱۵ <u>EC-129, "DTC Logic"</u> .	
Run engin he 1st trip E es >> Pe o >> G CHECK HE	e for at least 10 DTC P0171 dete ofform trouble di D TO 4. ATED OXYGEI	ected or di iagnosis fo N SENSO	at idle speed. fficult to start engine? or DTC P0171. Refer to R 1 HEATER	EC-129, "DTC Logic".	
Run engin the 1st trip E es >> Pe o >> GC CHECK HE fer to <u>EC-11</u>	e for at least 10 DTC P0171 dete erform trouble di D TO 4.	ected or di iagnosis fo N SENSO	at idle speed. fficult to start engine? or DTC P0171. Refer to R 1 HEATER	EC-129, "DTC Logic".	
Run engin he 1st trip E es >> Pe o >> GO CHECK HE fer to EC-11 nspection re ES >> GO	e for at least 10 <u>OTC P0171 dete</u> ofform trouble di D TO 4. ATED OXYGEN <u>6. "Component</u> esult normal? D TO 5.	ected or di iagnosis fo N SENSOI	at idle speed. <u>fficult to start engine?</u> or DTC P0171. Refer to R 1 HEATER <u>n"</u> .	EC-129, "DTC Logic".	_
Run engin he 1st trip E es >> Pe o >> GC CHECK HE fer to <u>EC-11</u> nspection re ES >> GC O >> Re	e for at least 10 <u>OTC P0171 dete</u> form trouble di D TO 4. ATED OXYGEN <u>6. "Component</u> <u>esult normal?</u> D TO 5. eplace heated o	ected or di iagnosis fo N SENSO Inspectio	at idle speed. <u>fficult to start engine?</u> or DTC P0171. Refer to R 1 HEATER <u>n</u> <sup>*</sup> .	EC-129, "DTC Logic".	
Run engin the 1st trip E es >> Pe o >> GC CHECK HE fer to EC-11 nspection re ES >> GC O >> Re	e for at least 10 <u>OTC P0171 dete</u> ofform trouble di D TO 4. ATED OXYGEN <u>6. "Component</u> esult normal? D TO 5.	ected or di iagnosis fo N SENSO Inspectio	at idle speed. <u>fficult to start engine?</u> or DTC P0171. Refer to R 1 HEATER <u>n</u> <sup>*</sup> .	EC-129, "DTC Logic".	
Run engin he 1st trip E es >> Pe o >> GO CHECK HE fer to EC-11 nspection re ES >> GO O >> Re CHECK HE fer to EC-17	e for at least 10 <u>OTC P0171 dete</u> form trouble di D TO 4. ATED OXYGEN 6. "Component esult normal? D TO 5. eplace heated o ATED OXYGEN 79. "Component	ected or di iagnosis fo N SENSO Inspectio xygen ser	at idle speed. fficult to start engine? or DTC P0171. Refer to R 1 HEATER n <sup>*</sup> . nsor 1. R 1	EC-129, "DTC Logic".	
Run engin he 1st trip E es >> Pe o >> GO CHECK HE fer to EC-11 nspection re CHECK HE CHECK HE fer to EC-17 nspection re	e for at least 10 <u>OTC P0171 dete</u> form trouble di D TO 4. ATED OXYGEN 6. "Component esult normal? D TO 5. eplace heated o ATED OXYGEN 79. "Component esult normal?	ected or di iagnosis fo N SENSO Inspectio xygen ser	at idle speed. fficult to start engine? or DTC P0171. Refer to R 1 HEATER n <sup>*</sup> . nsor 1. R 1	EC-129, "DTC Logic".	
Run engin he 1st trip E es >> Pe o >> GO CHECK HE fer to EC-11 nspection re CHECK HE fer to EC-17 nspection re ES >> GO	e for at least 10 <u>OTC P0171 dete</u> form trouble di D TO 4. ATED OXYGEN 6. "Component esult normal? D TO 5. eplace heated of ATED OXYGEN 29. "Component esult normal? D TO 6.	ected or di iagnosis fo N SENSO Inspectio Xygen ser N SENSO Inspectio	at idle speed. fficult to start engine? or DTC P0171. Refer to R 1 HEATER n". nsor 1. R 1 <u>n"</u> .	EC-129, "DTC Logic".	
Run enginthe 1st trip Ees $>>$ Pe $o$ $>>$ GCCHECK HEfer to EC-11nspection reES $>>$ GCCHECK HEfer to EC-17nspection reES $>>$ GC $O$ $>>$ Re $O$ $>>$ Re	e for at least 10 <u>OTC P0171 dete</u> form trouble di D TO 4. ATED OXYGEN 6. "Component esuit normal? D TO 5. eplace heated of <u>79. "Component</u> esuit normal? D TO 6. eplace heated of Place heated of	ected or di iagnosis fo N SENSO Inspectio Xygen ser N SENSO Inspectio	at idle speed. fficult to start engine? or DTC P0171. Refer to R 1 HEATER n". nsor 1. R 1 <u>n"</u> .	EC-129, "DTC Logic".	
Run engin he 1st trip E es $>>$ Pe o $>>$ G CHECK HE fer to EC-11 nspection re ES $>>$ G CHECK HE fer to EC-17 nspection re ES $>>$ G O $>>$ Re CHECK INT	e for at least 10 <u>OTC P0171 dete</u> form trouble di D TO 4. ATED OXYGEN 6. "Component esuit normal? D TO 5. eplace heated of ATED OXYGEN 79. "Component esuit normal? D TO 6. eplace heated of TERMITTENT II	ected or di iagnosis fo N SENSO Inspectio Xygen ser N SENSO Inspectio	at idle speed. fficult to start engine? or DTC P0171. Refer to R 1 HEATER n". nsor 1. R 1 <u>n"</u> .	EC-129, "DTC Logic".	
Run engin the 1st trip E es $>>$ Pe o $>>$ GC CHECK HE fer to EC-11 nspection re ES $>>$ GC O $>>$ Re CHECK HE fer to EC-17 nspection re ES $>>$ GC O $>>$ Re CHECK INT	e for at least 10 <u>OTC P0171 dete</u> form trouble di D TO 4. ATED OXYGEN 6. "Component esuit normal? D TO 5. eplace heated of <u>79. "Component</u> esuit normal? D TO 6. eplace heated of Place heated of	ected or di iagnosis fo N SENSO Inspectio Xygen ser N SENSO Inspectio	at idle speed. fficult to start engine? or DTC P0171. Refer to R 1 HEATER n". nsor 1. R 1 <u>n"</u> .	EC-129, "DTC Logic".	
Run engin he 1st trip E es >> Pe o >> GC CHECK HE fer to EC-11 nspection re ES >> GC O >> Re CHECK HE fer to EC-17 nspection re ES >> GC O >> Re CHECK INT rform GI-38	e for at least 10 <u>OTC P0171 dete</u> form trouble di D TO 4. ATED OXYGEN 6. "Component esuit normal? D TO 5. eplace heated of ATED OXYGEN 79. "Component esuit normal? D TO 6. eplace heated of TERMITTENT II	ected or di iagnosis fo N SENSO Inspectio Xygen ser N SENSO Inspectio Xygen ser NCIDENT Incident".	at idle speed. fficult to start engine? or DTC P0171. Refer to R 1 HEATER n". nsor 1. R 1 <u>n"</u> .	EC-129, "DTC Logic".	
Run engin he 1st trip E es >> Pe o >> GO CHECK HE fer to EC-11 nspection re ES >> GO O >> Re CHECK HE fer to EC-17 nspection re ES >> GO O >> Re CHECK INT rform GI-38	e for at least 10 <u>OTC P0171 dete</u> form trouble di D TO 4. ATED OXYGEN 6. "Component esult normal? D TO 5. eplace heated of ATED OXYGEN 79. "Component esult normal? D TO 6. eplace heated of TERMITTENT II , "Intermittent In	ected or di iagnosis fo N SENSO Inspectio Xygen ser N SENSO Inspectio Xygen ser NCIDENT Incident".	at idle speed. fficult to start engine? or DTC P0171. Refer to R 1 HEATER n". nsor 1. R 1 <u>n"</u> .	EC-129. "DTC Logic"	
Run engin he 1st trip E es >> Pe o >> GC CHECK HE fer to EC-11 nspection re ES >> GC O >> Re CHECK HE fer to EC-17 nspection re ES >> GC O >> Re CHECK INT rform GI-38 >> IN pmponent	e for at least 10 <u>OTC P0171 dete</u> form trouble di D TO 4. ATED OXYGEN 6. "Component esult normal? D TO 5. eplace heated of ATED OXYGEN 29. "Component esult normal? D TO 6. eplace heated of TERMITTENT II "Intermittent In SPECTION EN	ected or di iagnosis fo N SENSO Inspectio Xygen ser N SENSO Inspectio Xygen ser NCIDENT Incident".	at idle speed. <u>fficult to start engine?</u> or DTC P0171. Refer to R 1 HEATER <u>n"</u> . nsor 1. R 1 <u>n"</u> . nsor 1.	· · · · · · · · · · · · · · · · · · ·	

EC-179

#### P1143 HO2S1

### www.digitalkhodro.com

#### < COMPONENT DIAGNOSIS >

[MR20DE]

	ECM				
Consector	+ -		Condition	Voltage	
Connector	Terminal	Terminal			
F8	49 (HO2S1 signal)	56	Engine speed held at 2,000 rpm constant under no load.	<ul> <li>The voltage fluctuates between 0 to 0.3V and 0.6 to 1.0V more than 5 times within 10 seconds.</li> <li>The maximum voltage is over 0.6V at least 1 time.</li> <li>The minimum voltage is below 0.3V at least 1 time</li> <li>The voltage never exceeds 1.0V.</li> <li>1 time: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V</li> <li>2 times: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V → 0.6 - 1.0V</li> <li>→ 0 - 0.3V</li> </ul>	
s the inspection	n result normal	?			
	SPECTION ENI D TO 2.	D	•		
_	HEATED OXYG	EN SENS	SOR 1		

Replace heated oxygen sensor 1. CAUTION:

Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.

• Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool (commercial service tool) and approved anti-seize lubricant (commercial service tool).

>> INSPECTION END

شرکت دیجیتال خودرو سامانه (مسئولیت محدود

اولين سامانه ديجيتال تعميركاران خودرو در ايران
P1144 HO2S1

< COMPONENT DIAGNOSIS >

#### P1144 HO2S1

#### Description

The heated oxygen sensor 1 is placed into the exhaust manifold. It detects the amount of oxygen in the exhaust gas compared to the outside air. The heated oxygen sensor 1 has a closed-end tube made of ceramic zirconia. The zirconia generates voltage from approximately 1V in richer conditions to 0V in leaner conditions. The heated oxygen sensor 1 signal is sent to the ECM. The ECM adjusts the injection pulse duration to achieve the ideal air-fuel ratio. The ideal air-fuel ratio occurs near the radical change from 1V to 0V.



Heater pad

#### DTC Logic

#### DTC DETECTION LOGIC

To judge the malfunction, the output from the heated oxygen sensor 1 is monitored to determine whether the "rich" output is sufficiently high and "lean" output is sufficiently low. When both the outputs are shifting to the rich side, the malfunction will be detected.

ок	NG
1V 0.8V 0.35V	
ov	

Mixture ratio

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1144	Heated oxygen sensor 1 rich shift monitoring	The maximum and minimum voltages from the sensor are beyond the specified voltages.	<ul> <li>Heated oxygen sensor 1</li> <li>Heated oxygen sensor 1 heater</li> <li>Fuel pressure</li> <li>Fuel injector</li> </ul>

**Component Function Check** 

#### **1.**PERFORM COMPONENT FUNCTION CHECK

1. Start engine and warm it up to normal operating temperature.

2. Check the voltage between ECM harness connector terminals.

www.digitalkhodro.com

[MR20DE]

INFOID:000000004899952

Louver

Holder

Α

EC

С

D

E

F

G

J

K

Ł

Μ

N

0

SEF2880

INFOID:0000000004899953

INFOID:00000000489995

P1144 HO2S1

### < COMPONENT DIAGNOSIS >

[MR20DE]

	ECM			· · · · · · · · · · · · · · · · · · ·	
Connector	+		Condition	Voltage	
	Terminal	Terminal			
F8	49 (HO2S1 signal)	<sub>,</sub> 56	Engine speed held at 2,000 rpm constant under no load.	<ul> <li>The maximum voltage is below 0.8 at least</li> <li>The minimum voltage is below 0.35 at least</li> </ul>	
	on result normal		· · · · ·		
	SPECTION ENI to <u>EC-182, "Di</u>		rocedure"		
)iagnosis F	÷	<u>agnosis r</u>	<u>1000ddio</u> .	INFOID.000	 200000489995
.CHECK GF		CTION			
. Turn ignitie	on switch OFF.		,		I
			E38. Refer to Ground Ins	spection in GI-40, "Circuit Inspection".	ı
	on result normal O TO 2.	<u>ſ</u>			
	epair or replace	ground co	onnection.		
2.RETIGHTE	N HEATED OX	YGEN ŚE	NSOR 1		
oosen and re	tighten heated o	oxygen se	nsor 1. Refer to EM-151	"Removal and Installation".	1
	О ТО 3.				:
	E SELF-LEARN	IING DAL	A		
				MIXTURE RATIO SELF-LEARNING	VALUE
CLEAR : S	mixture ratio se Special Repair F le for at least 10	Requireme	ent".	MIXTURE RATIO SELF-LEARNING	VALUE
CLEAR : S Run engin	Special Repair F le for at least 10	Requireme minutes a	<u>nt"</u> . at idle speed.	MIXTURE RATIO SELF-LEARNING	VALUE t
<u>CLEAR : S</u> Run engin	<u>Special Repair F</u> le for at least 10 DTC P0172 dete	equireme minutes a ected or di	nt". at idle speed. <u>ifficult to start engine?</u>		t 2
<u>CLEAR : S</u> Run engin s the 1st trip [ Yes >> Pe	<u>Special Repair F</u> le for at least 10 DTC P0172 dete	equireme minutes a ected or di	<u>nt"</u> . at idle speed.		VALUE 1
CLEAR : S Run engin s the 1st trip I Yes >> Pe No >> G	<u>Special Repair F</u> le for at least 10 <u>OTC P0172 dete</u> erform trouble d O TO 4	equireme minutes ected or di iagnosis fo	nt". at idle speed. <u>ifficult to start engine?</u>	EC-129. "DTC Logíc".	VALUE 1
CLEAR : S Run engin s the 1st trip f Yes >> Pe No >> G CHECK HE . Turn igniti	Special Repair F te for at least 10 OTC P0172 dete erform trouble d O TO 4 EATED OXYGEI on switch OFF.	ected or di iagnosis fo N SENSO	nt". at idle speed. ifficult to start engine? or DTC P0172. Refer to R 1 CONNECTOR FOR	EC-129. "DTC Logíc".	t t
CLEAR : S Run engine the 1st trip ( Yes >> Pe No >> G CHECK HE . Turn igniti	DTC P0172 dete of for at least 10 DTC P0172 dete ofform trouble d O TO 4 EATED OXYGEI on switch OFF. ct heated oxyge	ected or di iagnosis fo N SENSO	nt". at idle speed. ifficult to start engine? or DTC P0172. Refer to	EC-129. "DTC Logíc".	
CLEAR : S Run engin s the 1st trip ( Yes >> Pe No >> G CHECK HE . Tum igniti . Disconned . Check com	Special Repair F le for at least 10 DTC P0172 dete erform trouble d O TO 4 EATED OXYGEI on switch OFF. ct heated oxygen nnectors for wat	equireme minutes a ected or di iagnosis fo N SENSO n sensor f er.	nt". at idle speed. ifficult to start engine? or DTC P0172. Refer to R 1 CONNECTOR FOR	EC-129. "DTC Logíc".	
CLEAR : S Run engin s the 1st trip I Yes >> Pe No >> G CHECK HE . Tum igniti Disconnee . Check com	DTC P0172 dete of for at least 10 DTC P0172 dete ofform trouble d O TO 4 EATED OXYGEI on switch OFF. ct heated oxyge	equireme minutes a ected or di iagnosis fo N SENSO n sensor f er.	nt". at idle speed. ifficult to start engine? or DTC P0172. Refer to R 1 CONNECTOR FOR	EC-129. "DTC Logíc".	
CLEAR : S Run engin s the 1st trip f Yes >> Po No >> G CHECK HE . Turn igniti Disconned . Check con Water s the inspection	Special Repair F te for at least 10 OTC P0172 dete enform trouble d O TO 4 EATED OXYGEI on switch OFF. In heated oxyget nectors for wat should not exist on result normal	ected or di agnosis fo N SENSO n sensor f er. st.	nt". at idle speed. ifficult to start engine? or DTC P0172. Refer to R 1 CONNECTOR FOR	EC-129. "DTC Logíc".	t t
CLEAR : S Run engin sthe 1st trip I Yes >> Po No >> G CHECK HE . Turn igniti . Disconned . Check con Water s the inspection YES >> G	Special Repair F te for at least 10 OTC P0172 deter enform trouble d O TO 4 EATED OXYGEI on switch OFF. It heated oxygeinnectors for wat should not exist on result normal O TO 5.	ected or di iagnosis fo N SENSO n sensor f er. st.	at idle speed. <u>ifficult to start engine?</u> or DTC P0172. Refer to R 1 CONNECTOR FOR 1 harness connector.	EC-129. "DTC Logíc".	
CLEAR : S Run engin the 1st trip ( Yes >> Pe No >> G CHECK HE . Tum igniti . Disconned . Check con Water sthe inspection YES >> G NO >> R	Special Repair F te for at least 10 OTC P0172 deter ofform trouble di O TO 4 EATED OXYGEI on switch OFF. on switch OFF. on switch OFF. on sectors for wat should not exist on result normal O TO 5. epair or replace	Acted or di iagnosis fo N SENSO n sensor f er. st. l? harness o	at idle speed. <u>ifficult to start engine?</u> or DTC P0172. Refer to R 1 CONNECTOR FOR 1 harness connector.	EC-129. "DTC Logíc".	
CLEAR : S Run engin the 1st trip ( Yes >> Pe No >> G CHECK HE Disconned Check con Water Sthe inspection YES >> G NO >> R D.CHECK HE	Special Repair F te for at least 10 OTC P0172 dete ofform trouble di O TO 4 EATED OXYGE! on switch OFF. on switch OFF. on switch OFF. on result normal O TO 5. epair or replace EATED OXYGE!	Acted or di iagnosis fo N SENSO n sensor f er. st. l? harness o N SENSO	at idle speed. ifficult to start engine? or DTC P0172. Refer to R 1 CONNECTOR FOR 1 harness connector. or connectors. OR 1 HEATER	EC-129. "DTC Logíc".	YALUE
CLEAR : S Run enginer Sthe 1st trip ( Yes >> Pe No >> G CHECK HE Disconner Check con Water Sthe inspection YES >> G NO >> R D.CHECK HE Refer to EC-1	Special Repair F te for at least 10 OTC P0172 deter ofform trouble di O TO 4 EATED OXYGEI on switch OFF. on switch OFF. on switch OFF. on sectors for wat should not exist on result normal O TO 5. epair or replace	Acted or di ininutes a iagnosis fo N SENSO n sensor f er. st. l? harness o N SENSO t Inspectio	at idle speed. ifficult to start engine? or DTC P0172. Refer to R 1 CONNECTOR FOR 1 harness connector. or connectors. OR 1 HEATER	EC-129. "DTC Logíc".	
CLEAR : S Run enginer Sthe 1st trip ( Yes >> Po No >> G CHECK HE Disconner Check con Water YES >> G NO >> R D.CHECK HE Refer to EC-1 s the inspecti YES >> G	Special Repair F te for at least 10 OTC P0172 deternorm of the trouble diversion of trouble diversion of trouble diversion of the trouble diversio	Acted or di iagnosis for N SENSO In sensor for er. st. 12 N SENSO L Inspectio 12	at idle speed. ifficult to start engine? or DTC P0172. Refer to R 1 CONNECTOR FOR 1 harness connector. or connectors. OR 1 HEATER on".	EC-129. "DTC Logíc".	
CLEAR : S Run engin Sthe 1st trip ( Yes >> Pe No >> G CHECK HE Disconned Check con Water Sthe inspectio YES >> G NO >> R D.CHECK HE Refer to EC-1 sthe inspectio YES >> G NO >> R	DTC P0172 dete efor at least 10 DTC P0172 dete efform trouble d O TO 4 EATED OXYGEI on switch OFF. theated oxygen nectors for wat should not exis on result normal O TO 5. epair or replace EATED OXYGEI 28. "Component on result normal O TO 6. eplace heated o	Acted or di ininutes a iagnosis fo N SENSO n sensor f er. st. l? harness o N SENSO t Inspectio l? exygen sel	at idle speed. ifficult to start engine? or DTC P0172. Refer to R 1 CONNECTOR FOR 1 harness connector. or connectors. or 1 HEATER on".	EC-129. "DTC Logíc".	
CLEAR : S Run engin Sthe 1st trip ( Yes >> Pe No >> G CHECK HE Disconned Check con Water Sthe inspectio YES >> G NO >> R D.CHECK HE Refer to EC-1 Sthe inspectio YES >> G NO >> R D.CHECK HE	DTC P0172 dete efor at least 10 DTC P0172 dete efform trouble d O TO 4 EATED OXYGE! on switch OFF. theated oxygen nectors for wat should not exis on result normal O TO 5. epair or replace EATED OXYGE! 28. "Component on result normal O TO 6. eplace heated of EATED OXYGE!	Acted or di ininutes a iagnosis fo N SENSO n sensor f er. st. 1? harness o N SENSO t Inspectio 1? N SENSO	at idle speed. ifficult to start engine? or DTC P0172. Refer to R 1 CONNECTOR FOR 1 harness connector. or connectors. R 1 HEATER on". Insor 1. OR 1	EC-129. "DTC Logíc".	
CLEAR : S Run engin sthe 1st trip I Yes >> Po No >> G CHECK HE Disconned Check con Water Sthe inspectio YES >> G NO >> R D.CHECK HE Refer to EC-1 YES >> G NO >> R D.CHECK HE Refer to EC-1	Special Repair F le for at least 10 DTC P0172 deternorm enform trouble di O TO 4 EATED OXYGEI on switch OFF. on switch OFF. on result normal O TO 5. epair or replace EATED OXYGEI 28. "Component on result normal O TO 6. eplace heated of EATED OXYGEI 83. "Component	ected or di iagnosis fo N SENSO N SENSO n sensor 1 er. st. 1? harness o N SENSO t Inspectio N SENSO t Inspectio N SENSO t Inspectio	at idle speed. ifficult to start engine? or DTC P0172. Refer to R 1 CONNECTOR FOR 1 harness connector. or connectors. R 1 HEATER on". Insor 1. OR 1	EC-129. "DTC Logíc".	
CLEAR : S Run engin the 1st trip f Yes >> Pe No >> G CHECK HE Disconned Check con Water YES >> G NO >> R D.CHECK HE Refer to EC-1 S the inspecti YES >> G NO >> R D.CHECK HE Refer to EC-1 s the inspecti YES >> G NO >> R	Special Repair F le for at least 10 DTC P0172 dete enform trouble di O TO 4 EATED OXYGE! on switch OFF. theated oxyget nectors for wat should not exit on result normal O TO 5. epair or replace EATED OXYGE! 28. "Component on result normal O TO 6. eplace heated of EATED OXYGE! 83. "Component on result normal	ected or di iagnosis fo N SENSO N SENSO n sensor 1 er. st. 1? harness o N SENSO t Inspectio N SENSO t Inspectio N SENSO t Inspectio	at idle speed. ifficult to start engine? or DTC P0172. Refer to R 1 CONNECTOR FOR 1 harness connector. or connectors. R 1 HEATER on". Insor 1. OR 1	EC-129. "DTC Logíc".	
CLEAR : S Run engin the 1st trip ( Yes >> Pe No >> G CHECK HE Disconned Check con Water Sthe inspectio YES >> G NO >> R D.CHECK HE Refer to EC-1 S the inspectio YES >> G NO >> R D.CHECK HE Refer to EC-1 s the inspectio YES >> G NO >> R D.CHECK HE Refer to EC-1 S the inspectio YES >> G	Special Repair F le for at least 10 DTC P0172 deternorm enform trouble di O TO 4 EATED OXYGEI on switch OFF. on switch OFF. on result normal O TO 5. epair or replace EATED OXYGEI 28. "Component on result normal O TO 6. eplace heated of EATED OXYGEI 83. "Component	Acted or di ininutes a iagnosis fo N SENSO n sensor f er. st. ? harness o N SENSO t Inspectio !? N SENSO t Inspectio !?	at idle speed. ifficult to start engine? or DTC P0172. Refer to R 1 CONNECTOR FOR 1 harness connector. or connectors. R 1 HEATER on". Insor 1. OR 1 OR 1 ON".	EC-129. "DTC Logíc".	

ali arita II da a aluar a a una

	NT DIAGNOSI	S >	<u> </u>	[MR20DE	<b>-</b> ]
7.CHECK IN		NCIDENT			
Refer to GI-38	<u>, "Intermittent In</u>	icident".		1	ł
>> IN	SPECTION EN	D		· .	
Componen	t Inspection			INFOID:000000004893	995
1.снеск не			• R 1	• ., .	
1. Start engir	ne and warm it u	up to norm	al operating temperature		
2. Check thể	voltage betwee	en ECM ha	amess connector termina	als.	
i	ECM		]	· · · · · · · · · · · · · · · · · · ·	
Connector	+	-	Condition	Voltage	,
	Terminal	Terminal		The voltage fluctuates between 0 to 0.3V and 0.6 t	to
:				1.0V more than 5 times within 10 seconds. • The maximum voltage is over 0.6V at least 1 time.	
F8 · · · ·	49 (HO2S1 signal)	56	Engine speed held at 2,000 pm constant under no load.	<ul> <li>The minimum voltage is below 0.3V at least 1 time</li> <li>The voltage never exceeds 1.0V.</li> </ul>	
- - -				1 time: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V 2 times: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V → 0.6 - 1.0	v
			<u>.</u>	→ 0 - 0.3V	
	on result normal SPECTION EN	•			
NO >> G	О ТО 2.				
<b>A</b>					
2.REPLACE	HEATED OXYG	EN SENS	SOR 1		
Replace heate	HEATED OXYG		SOR 1	<u>شرک</u>	-
Replace heate CAUTION: • Discard any	ed oxygen senso / heated oxyge	or 1. I <mark>n sensor</mark>	which has been dropp	ped from a height of more than 0.5 m (19	
Replace heate CAUTION: • Discard any in) onto a h	ed oxygen senso / heated oxyge ard surface suc	or 1. In sensor ch as a co	which has been dropp	w one.	
Replace heate CAUTION: • Discard any in) onto a h • Before inst	ed oxygen senso heated oxyge ard surface such alling new oxy	or 1. In sensor ch as a co gen sens	which has been dropp oncrete floor; use a new or, clean exhaust syst		ac
Replace heate CAUTION: • Discard any in) onto a h • Before inst Cleaner too	ed oxygen senso heated oxyge ard surface such alling new oxy	or 1. on sensor ch as a co gen sens service to	which has been dropp oncrete floor; use a new or, clean exhaust syst	w one. tem threads using Oxygen Sensor Threa	ac
Replace heate CAUTION: • Discard any in) onto a h • Before inst Cleaner too	ed oxygen senso heated oxyge ard surface suc alling new oxy l (commercial s	or 1. on sensor ch as a co gen sens service to	which has been dropp oncrete floor; use a new or, clean exhaust syst	w one. tem threads using Oxygen Sensor Threa	ad
Replace heate CAUTION: • Discard any in) onto a h • Before inst Cleaner too	ed oxygen senso heated oxyge ard surface suc alling new oxy l (commercial s	or 1. on sensor ch as a co gen sens service to	which has been dropp oncrete floor; use a new or, clean exhaust syst	w one. tem threads using Oxygen Sensor Threa	ac
Replace heate CAUTION: • Discard any in) onto a h • Before inst Cleaner too	ed oxygen senso heated oxyge ard surface suc alling new oxy l (commercial s	or 1. on sensor ch as a co gen sens service to	which has been dropp oncrete floor; use a new or, clean exhaust syst	w one. tem threads using Oxygen Sensor Threa	ac
Replace heate CAUTION: • Discard any in) onto a h • Before inst Cleaner too	ed oxygen senso heated oxyge ard surface suc alling new oxy l (commercial s	or 1. on sensor ch as a co gen sens service to	which has been dropp oncrete floor; use a new or, clean exhaust syst	w one. tem threads using Oxygen Sensor Threa	ac
Replace heate CAUTION: • Discard any in) onto a h • Before inst Cleaner too	ed oxygen senso heated oxyge ard surface suc alling new oxy l (commercial s	or 1. on sensor ch as a co gen sens service to	which has been dropp oncrete floor; use a new or, clean exhaust syst	w one. tem threads using Oxygen Sensor Threa	ac
Replace heate CAUTION: • Discard any in) onto a h • Before inst Cleaner too	ed oxygen senso heated oxyge ard surface suc alling new oxy l (commercial s	or 1. on sensor ch as a co gen sens service to	which has been dropp oncrete floor; use a new or, clean exhaust syst	w one. tem threads using Oxygen Sensor Threa	ac
Replace heate CAUTION: • Discard any in) onto a h • Before inst Cleaner too	ed oxygen senso heated oxyge ard surface suc alling new oxy l (commercial s	or 1. on sensor ch as a co gen sens service to	which has been dropp oncrete floor; use a new or, clean exhaust syst	w one. tem threads using Oxygen Sensor Threa	ac
Replace heate CAUTION: • Discard any in) onto a h • Before inst Cleaner too	ed oxygen senso heated oxyge ard surface suc alling new oxy l (commercial s	or 1. on sensor ch as a co gen sens service to	which has been dropp oncrete floor; use a new or, clean exhaust syst	w one. tem threads using Oxygen Sensor Threa	ac
Replace heate CAUTION: • Discard any in) onto a h • Before inst Cleaner too	ed oxygen senso heated oxyge ard surface suc alling new oxy l (commercial s	or 1. on sensor ch as a co gen sens service to	which has been dropp oncrete floor; use a new or, clean exhaust syst	w one. tem threads using Oxygen Sensor Threa	ac
Replace heate CAUTION: • Discard any in) onto a h • Before inst Cleaner too	ed oxygen senso heated oxyge ard surface suc alling new oxy l (commercial s	or 1. on sensor ch as a co gen sens service to	which has been dropp oncrete floor; use a new or, clean exhaust syst	w one. tem threads using Oxygen Sensor Threa	ac
Replace heate CAUTION: • Discard any in) onto a h • Before inst Cleaner too	ed oxygen senso heated oxyge ard surface suc alling new oxy l (commercial s	or 1. on sensor ch as a co gen sens service to	which has been dropp oncrete floor; use a new or, clean exhaust syst	w one. tem threads using Oxygen Sensor Threa	ad
Replace heate CAUTION: • Discard any in) onto a h • Before inst Cleaner too	ed oxygen senso heated oxyge ard surface suc alling new oxy l (commercial s	or 1. on sensor ch as a co gen sens service to	which has been dropp oncrete floor; use a new or, clean exhaust syst	w one. tem threads using Oxygen Sensor Threa	ac

P1146 HO2S2

#### < COMPONENT DIAGNOSIS >

### P1146 HO2S2

#### Description

The heated oxygen sensor 2, after three way catalyst (manifold), monitors the oxygen level in the exhaust gas on each bank.

Even if switching characteristics of the heated oxygen sensor 1 are shifted, the air-fuel ratio is controlled to stoichiometric, by the signal from the heated oxygen sensor 2.

This sensor is made of ceramic zirconia. The zirconia generates voltage from approximately 1V in richer conditions to 0V in leaner conditions.

Under normal conditions the heated oxygen sensor 2 is not used for engine control operation.

### DTC Logic

#### DTC DETECTION LOGIC

The heated oxygen sensor 2 has a much longer switching time between rich and lean than the heated oxygen sensor 1. The oxygen storage capacity of the three way catalyst (manifold) causes the longer switching time. To judge the malfunctions of heated oxygen sensor 2, ECM monitors whether the maximum voltage of the sensor is sufficiently low during the various driving condition such as fuelcut.

# 1V 0.46V οv

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1146	Heated oxygen sensor 2 minimum voltage moni- toring	The minimum voltage from the sensor is not reached to the specified voltage.	<ul> <li>Harness or connectors <ul> <li>(The sensor circuit is open or shorted)</li> <li>Heated oxygen sensor 2</li> <li>Fuel pressure</li> <li>Fuel injector</li> <li>Intake air leaks</li> </ul> </li> </ul>

### Component Function Check

INFOID-000000004899959

021-62999292

JMBIA 1342G

#### **1.**PERFORM COMPONENT FUNCTION CHECK-I

- 1. Start engine and warm it up to the normal operating temperature.
- 2. Turn ignition switch OFF and wait at least 10 seconds.
- Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load. 3.
- 4. Let engine idle for 1 minute.

021-62999292

5. Check the voltage between ECM harness connector terminals under the following condition.

	ECM		ECM		· · · · · ·	
Connector	+	-	Condition	Voltage		
Connector	Terminal	Terminal				
F8	50 (HO2S2 signal)	59	Revving up to 4,000 rpm under no load at least 10 times	The voltage should be below 0.46 V at least once during this procedure.		
ls the insp	ection result no	ormal?		· · · · · · · · · · · · · · · · · · ·		
YES >	> INSPECTIO	N END		1		
NO >	> GO TO 2.					

# Holder Heater pad

SEF327









[MR20DE]

INFOID:000000004899957

### P1146 HO2S2

### www.digitalkhodro.com

[MR20DE]

Α'

#### < COMPONENT DIAGNOSIS >

### 2. PERFORM COMPONENT FUNCTION CHECK-II

Check the voltage between ECM harness connector terminals under the following condition.

	ECM			i S
Connector	+	-	Condition	Voltage
Connector	Terminal	Terminal		
F8	50 (HO2S2 signal)	59	Keeping engine speed at idle for 10 minutes	The voltage should be below 0.46 V at least once during this procedure.
s the insp	ection result ne	ormal?	·· ··· ···	
NO >	> INSPECTIO > GO TO 3.			
			NCTION CHECK-III	
Check the	voltage betwe	en ECM	hamess connector terminals unde	er the following condition.
			· · · · · ·	· · · · · · · · · · · · · · · · · · ·
	ECM			
Connector	+	-	Condition	Voltage -
	Terminal	Terminal		
F8	50 (HO2S2 signal)	59	Coasting from 80 km/h (50 MPH) in D position (CVT), 4th gear position (M/T)	The voltage should be below 0.46 V at least once during this procedure.
s the insp	ection result n	ormal?		
	> INSPECTIO			
YES >	> INSPECTION > Go to EC-18		osis Procedure".	
YES > NO >	> Go to <u>EC-18</u>	5, "Diagr	osis Procedure".	(NFC)1D: 0000000004899956
YES > NO > Diagnos	> Go to <u>EC-18</u> is Procedui	<u>5, "Diagr</u> re	یرکت دیجیتال خودرو	INFCHD:0000000048999360
YES > NO > Diagnos	> Go to <u>EC-18</u>	<u>5, "Diagr</u> re	یرکت دیجیتال خودرو	INFOID:000000004899960
YES > NO > Diagnos	> Go to <u>EC-18</u> is Procedui GROUND CC	5, "Diagr re DNNECT DFF.	برکت دیجیتال خودرور N	
YES > NO > Diagnos 1.CHECH 1. Turn i 2. Chech	> Go to <u>EC-18</u> is Procedui ( GROUND CC gnition switch ( c ground conne	5, "Diagr re DNNECT DFF. ection E2	برکت دیجیتال خودرور N	the ction in <u>GI-40, "Circuit Inspection"</u> .
YES NO Diagnos L.CHECH L. Turn i Check s the insp	> Go to <u>EC-18</u> is Procedui ( GROUND CC gnition switch ( ground conne ection result ne	5, "Diagr re DNNECT DFF. ection E2	برکت دیجیتال خودرور N	
YES > NO > Diagnos 1.CHECH 1. Turn i 2. Chech s the insp YES >	> Go to EC-18 is Procedured (GROUND CC gnition switch ( ground connection result nection result nection) > GO TO 2.	5, "Diagr re DNNECT DFF. ection E2 ormal?	ION 1 and E38. Refer to Ground Inspe	
YES > NO > Diagnos I.CHECH I. Turn i 2. Chech s the insp YES > NO >	> Go to EC-18 is Procedured (GROUND CC gnition switch ( ground connection result not > GO TO 2. > Repair or rep	5. "Diagr re DNNECT DFF. ection E2 ormal? Dlace gro	ION 1 and E38. Refer to Ground Inspe und connection.	
YES > NO > Diagnos 1.CHECH I. Turn i 2. Chech s the insp YES > NO > 2.CLEAF	> Go to EC-18 is Procedured (GROUND CC gnition switch ( ground connection result not > GO TO 2. > Repair or rep THE SELF-LE	5, "Diagr re DNNECT DFF. ection E2 ormal? blace gro EARNINC	ION 1 and E38. Refer to Ground Inspe und connection.	ction in <u>GI-40, "Circuit Inspection"</u> .
YES > NO > Diagnos I.CHECH I. Turn i 2. Chech s the insp YES > NO > 2.CLEAF	<ul> <li>&gt; Go to EC-18</li> <li>&gt; Go to EC-18</li> <li>&gt; GROUND CO</li> <li>&gt; gnition switch ( ground connection result no &gt; GO TO 2.</li> <li>&gt; Repair or repart of the SELF-LE</li> <li>&gt; mixture ratio</li> </ul>	5. "Diagr re DNNECT DFF. ection E2 ormal? Diace gro EARNING self-lean	ION 1 and E38. Refer to Ground Inspe und connection. 3 DATA hing value, refer to <u>EC-16, "MIX</u>	
YES > NO > Diagnos I.CHECH I. Turn i 2. Chech s the insp YES > NO > 2.CLEAF I. Clear <u>CLEA</u>	<ul> <li>&gt; Go to EC-18</li> <li>&gt; Go to EC-18</li> <li>&gt; GROUND CO</li> <li>gnition switch ( ground connection result needloop result needloop result needloop result needloop result needloop repair or repair or</li></ul>	5. "Diagr re DNNECT DFF. potion E2 prmal? place gro EARNING self-lean pair Requ	ION 1 and E38. Refer to Ground Inspe und connection. 3 DATA hing value, refer to <u>EC-16, "MIX</u>	ction in <u>GI-40, "Circuit Inspection"</u> .
YES > NO > Diagnos I.CHECH I. Turn i 2. Chech S the insp YES > NO > 2.CLEAF I. Clear <u>CLEA</u> 2. Run e	<ul> <li>&gt; Go to EC-18</li> <li>Sis Procedure</li> <li>(GROUND CO</li> <li>(GROUND CO</li> <li>(Ground connection result not connectio</li></ul>	5. "Diagr re DNNECT DFF. ection E2 ormal? blace gro EARNINC self-lean pair Requ	ION 1 and E38. Refer to Ground Inspe und connection. 5 DATA hing value, refer to <u>EC-16, "MIX</u> uirement".	ction in <u>GI-40, "Circuit Inspection"</u> .
YES > NO > Diagnos I.CHECH I. Turn i 2. Chech s the insp YES > NO > 2.CLEAF I. Clear <u>CLEA</u> I. Clear S the 1st YES >	<ul> <li>&gt; Go to EC-18</li> <li>&gt; Go to EC-18</li> <li>&gt; GROUND CO</li> <li>gnition switch ( ground connection result network)</li> <li>&gt; GO TO 2.</li> <li>&gt; Repair or repa</li></ul>	5. "Diagr re DNNECT DFF. ection E2 ormal? Diace gro EARNING self-lean pair Requ ast 10 min 2 detecte	ION 1 and E38. Refer to Ground Inspe und connection. a DATA hing value, refer to <u>EC-16, "MIX</u> <u>direment"</u> . hutes at idle speed.	ction in <u>GI-40, "Circuit Inspection"</u> .
YES > NO > Diagnos I.CHECH I. Turn i 2. Chech S the insp YES > NO > 2.CLEAF I. Clear <u>CLEA</u> 2. Run e s the 1st 1 YES > NO >	<ul> <li>&gt; Go to EC-18</li> <li>&gt; Go to EC-18</li> <li>&gt; S Procedure</li> <li>&gt; GROUND CO</li> <li>&gt; ground connection result network</li> <li>&gt; GO TO 2.</li> <li>&gt; Repair or rep</li></ul>	5. "Diagr re DNNECT DFF. ormal? blace gro EARNING self-lean pair Requ ast 10 min 2 detecte ble diagr	ION 1 and E38. Refer to Ground Inspe- und connection. a DATA hing value, refer to <u>EC-16, "MIX</u> <u>uirement".</u> hutes at idle speed. <u>d? Is it difficult to start engine?</u> hosis for DTC P0172. Refer to <u>EC</u>	ction in <u>GI-40, "Circuit Inspection"</u> .
YES > NO > Diagnos I.CHECH I. Turn i 2. Chech S the insp YES > NO > 2.CLEAF I. Clear <u>CLEA</u> 2. Run e s the 1st 1 YES > NO >	<ul> <li>&gt; Go to EC-18</li> <li>&gt; Go to EC-18</li> <li>&gt; S Procedure</li> <li>&gt; GROUND CO</li> <li>&gt; ground connection result network</li> <li>&gt; GO TO 2.</li> <li>&gt; Repair or rep</li></ul>	5. "Diagr re DNNECT DFF. ormal? blace gro EARNING self-lean pair Requ ast 10 min 2 detecte ble diagr	ION 1 and E38. Refer to Ground Inspe und connection. a DATA hing value, refer to <u>EC-16, "Mix</u> <u>uirement"</u> . hutes at idle speed. <u>d? Is it difficult to start engine?</u>	ction in <u>GI-40, "Circuit Inspection"</u> .
YES > NO > Diagnos I.CHECH I. Turn i S the insp YES > NO > CLEAF I. Clear CLEA CLEAF I. Clear S the 1st YES > NO > CLEAF I. Clear S the 1st YES > NO > CLEAF	<ul> <li>&gt; Go to EC-18</li> <li>&gt; Go to EC-18</li> <li>&gt; SProcedure</li> <li>&gt; GROUND CO</li> <li>&gt; ground connection result not connecting not connecting not connecting not connection result not conn</li></ul>	5. "Diagr re DNNECT DFF. ection E2 ormal? blace gro EARNING self-learn pair Requ ast 10 min 2 detecte ble diagr UND CIF DFF.	I and E38. Refer to Ground Inspe- und connection. DATA Data Data Data Ding value, refer to <u>EC-16, "MIX</u> <u>direment".</u> nutes at idle speed. <u>d? Is it difficult to start engine?</u> nosis for DTC P0172. Refer to <u>EC</u> RCUIT FOR OPEN AND SHORT	ction in <u>GI-40, "Circuit Inspection"</u> .
YES > NO > Diagnos I.CHECH I. Turn i 2. Chech s the insp YES > NO > 2.CLEAF I. Clear CLEA I. Clear S the 1st YES > NO > 3.CHECH I. Turn i 2. Disco	<ul> <li>&gt; Go to EC-18</li> <li>Sis Procedure</li> <li>GROUND CC</li> <li>Ground connection result network</li> <li>&gt; GO TO 2.</li> <li>&gt; Repair or repa</li></ul>	5. "Diagr Periodic Self-lear Part Requires the self-lear P	ION 1 and E38. Refer to Ground Inspe- und connection. a DATA bing value, refer to <u>EC-16, "MIX</u> <u>airement".</u> butes at idle speed. <u>d? Is it difficult to start engine?</u> bosis for DTC P0172. Refer to <u>EC</u> accult FOR OPEN AND SHORT ensor (HO2S) 2 harness connector	ction in <u>GI-40, "Circuit Inspection"</u> .
YES > NO > Diagnos I.CHECH I. Tum i 2. Chech s the insp YES > NO > 2.CLEAF I. Clear CLEAF I. Clear S the 1st YES > NO > 3.CLECH I. Tum i 2. Disco 3. Disco	<ul> <li>&gt; Go to EC-18</li> <li>&gt; Go to EC-18</li> <li>&gt; S Procedure</li> <li>&gt; GROUND CO</li> <li>&gt; gnition switch ( ground connection result network)</li> <li>&gt; GO TO 2.</li> <li>&gt; Repair or reparror for at lease trip DTC P0172</li> <li>&gt; Perform trout</li> <li>&gt; GO TO 3.</li> <li>&lt; HO2S2 GRO</li> <li>gnition switch ( nnect heated on nect ECM has</li> </ul>	5. "Diagr re DNNECT DFF. ection E2 ormal? Dace gro EARNING Self-lean pair Requ ast 10 min 2 detecte ble diagr UND CIF DFF. oxygen se rness cor	ION 1 and E38. Refer to Ground Inspe- und connection. a DATA hing value, refer to <u>EC-16, "MIX</u> <u>airement"</u> . hutes at idle speed. <u>d? Is it difficult to start engine?</u> hosis for DTC P0172. Refer to <u>EC</u> ACUIT FOR OPEN AND SHORT ensor (HO2S) 2 harness connector anector.	ction in <u>GI-40, "Circuit Inspection"</u> .
YES > NO > Diagnos I.CHECH I. Tum i 2. Chech s the insp YES > NO > 2.CLEAF I. Clear CLEAF I. Clear S the 1st YES > NO > 3.CLECH I. Tum i 2. Disco 3. Disco	<ul> <li>&gt; Go to EC-18</li> <li>&gt; Go to EC-18</li> <li>&gt; S Procedure</li> <li>&gt; GROUND CO</li> <li>&gt; gnition switch ( ground connection result network)</li> <li>&gt; GO TO 2.</li> <li>&gt; Repair or reparror for at lease trip DTC P0172</li> <li>&gt; Perform trout</li> <li>&gt; GO TO 3.</li> <li>&lt; HO2S2 GRO</li> <li>gnition switch ( nnect heated on nect ECM has</li> </ul>	5. "Diagr re DNNECT DFF. ection E2 ormal? Dace gro EARNING Self-lean pair Requ ast 10 min 2 detecte ble diagr UND CIF DFF. oxygen se rness cor	ION 1 and E38. Refer to Ground Inspe- und connection. a DATA bing value, refer to <u>EC-16, "MIX</u> <u>airement".</u> butes at idle speed. <u>d? Is it difficult to start engine?</u> bosis for DTC P0172. Refer to <u>EC</u> accult FOR OPEN AND SHORT ensor (HO2S) 2 harness connector	ction in <u>GI-40, "Circuit Inspection"</u> .
YES > NO > Diagnos I.CHECH I. Turn i 2. Chech s the insp YES > NO > 2.CLEAF I. Clear CLEA I. Clear S the 1st YES > NO > 3.CLEAF I. Clear S the 1st YES > NO > 3.CLEAF I. Clear CLEA S the 1st YES > NO > 3.CLEAF	<ul> <li>&gt; Go to EC-18</li> <li>&gt; Go to EC-18</li> <li>&gt; S Procedure</li> <li>&gt; GROUND CO</li> <li>&gt; gnition switch ( ground connection result network)</li> <li>&gt; GO TO 2.</li> <li>&gt; Repair or reparror for at lease trip DTC P0172</li> <li>&gt; Perform trout</li> <li>&gt; GO TO 3.</li> <li>&lt; HO2S2 GRO</li> <li>gnition switch ( nnect heated on nect ECM has</li> </ul>	5. "Diagr re DNNECT DFF. ection E2 ormal? Dace gro EARNING Self-lean pair Requ ast 10 min 2 detecte ble diagr UND CIF DFF. oxygen se rness cor	ION 1 and E38. Refer to Ground Inspe- und connection. a DATA hing value, refer to <u>EC-16, "MIX</u> <u>uirement".</u> hutes at idle speed. <u>d? Is it difficult to start engine?</u> hosis for DTC P0172. Refer to <u>EC</u> RCUIT FOR OPEN AND SHORT ensor (HO2S) 2 harness connector inector. HO2S2 harness connector and E	ction in <u>GI-40, "Circuit Inspection"</u> .
YES > NO > Diagnos I.CHECH I. Turn i 2. Chech s the insp YES > NO > 2.CLEAF I. Clear CLEA I. Clear S the 1st YES > NO > 3.CLEAF I. Clear S the 1st YES > NO > 3.CLEAF I. Clear CLEA S the 1st YES > NO > 3.CLEAF	> Go to EC-18 is Procedure (GROUND CC (GROUND CC (Ground connect ection result network > GO TO 2. > Repair or representation 3 THE SELF-LE mixture ratio R : Special Representation R : Special Representation R : Special Representation A THE SELF-LE mixture ratio R : Special Representation R : Special Representation A THE SELF-LE Mixture ratio R : Special Representation R	5. "Diagr re DNNECT DFF. ormal? Dace gro EARNING self-lean pair Requ ast 10 min 2 detecte ble diagr UND CIF DFF. DYgen se rness cor between ECM	ION 1 and E38. Refer to Ground Inspe- und connection. a DATA hing value, refer to <u>EC-16, "MIX</u> <u>airement"</u> . hutes at idle speed. <u>d? Is it difficult to start engine?</u> hosis for DTC P0172. Refer to <u>EC</u> ACUIT FOR OPEN AND SHORT ensor (HO2S) 2 harness connector anector.	ction in <u>GI-40, "Circuit Inspection"</u> .

www.digitalkhodro.com	P1146 HO2S2
< COMPONENT DIAGNOSIS >	
YES >> GO TO 5.	
NO >> GO TO 4.	
4. DETECT MALFUNCTIONING PART	

Check the following.

Harness connectors E7, F121

Harness for open or short between heated oxygen sensor 2 and ECM.

>> Repair open circuit or short to ground or short to power in harness or connectors.

### 5. CHECK HO2S2 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check the continuity between HO2S2 harness connector and ECM harness connector.

но	252	E	СМ	
Connector	Terminal	Connector	Terminal	Continuity
E58	4	F8	50	Existed

2. Check the continuity between HO2S2 harness connector or ECM harness connector and ground.

HO2S2		E	СМ	Ground	Continuity
Connector	Terminal	Connector	Terminal	alound	Continuity
E58	4	F8	50	Ground	Not existed

#### Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 7. NO >> GO TO 6.

 $\frac{1}{3} = \frac{1}{3} = \frac{1}$ 

6.DETECT MALFUNCTIONING PART

#### Check the following.

Harness connectors E7, F121

Harness for open or short between heated oxygen sensor 2 and ECM.

>> Repair open circuit or short to ground or short to power in harness or connectors.

#### 7.CHECK HEATED OXYGEN SENSOR 2

Refer to EC-186. "Component Inspection".

#### Is the inspection result normal?

YES >> GO TO 8.

NO >> Replace heated oxygen sensor 2.

**O.**CHECK INTERMITTENT INCIDENT

Refer to GI-38, "Intermittent Incident".

#### >> INSPECTION END

**Component Inspection** 

**1.**CHECK HEATED OXYGEN SENSOR 2-I

1. Start engine and warm it up to the normal operating temperature.

2. Turn ignition switch OFF and wait at least 10 seconds.

3. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.

- 4. Let engine idle for 1 minute.
- 5. Check the voltage between ECM harness connector terminals under the following condition.

INFOID:000000048

[MR20DE]

### P1146 HO2S2

www.digitalkhodro.com

[MR20DE]

#### < COMPONENT DIAGNOSIS >

	ECM			
	+	-	Condition	Voltage
Connector	•Terminal	Terminal		
F8	50 (HÖ2S2 signal)	59	Revving up to 4,000 rpm under no load at least 10 times	The voltage should be above 0.72V at least once during this procedure. The voltage should be below 0.46V at least once during this procedure.
s the insp	ection result no	ormal?	· · · ·	- · · · · · · · · · · · · · · · · · · ·
NO >	> INSPECTION > GO TO 2.		•	
2.CHECH	K HEATED OX	YGEN SE	ENSOR 2-II	
Check the	voltage betwee	en ECM i	harness connector terminals unde	r the following condition.
	ECM		· · · · · · · · ·	
Connector	+	· -	Condition	Voltage
Connector	Terminal	Terminal		
F8	50 (HO2S2 signal)	59	Keeping engine speed at idle for 10 minutes	The voltage should be above 0.72V at least once during this procedure. The voltage should be below 0.46V at least once during this procedure.
YES > NO >	<pre>&gt; INSPECTION &gt; GO TO 3. </pre>	NEND	ENSOR 2-III	
YES > NO > B.CHECH	<ul> <li>&gt; INSPECTION</li> <li>&gt; GO TO 3.</li> <li>&lt; HEATED OX<sup>1</sup></li> <li>voltage between</li> </ul>	N END YGEN SE	ENSOR 2-III harness connector terminals unde	r the following condition.
YES > NO > B.CHECH	> INSPECTION > GO TO 3. < HEATED OX <sup>1</sup>	N END YGEN SE	harness connector terminals unde	
YES > NO > B.CHECH Check the	<ul> <li>&gt; INSPECTION</li> <li>&gt; GO TO 3.</li> <li>&lt; HEATED OX<sup>1</sup></li> <li>voltage between</li> <li>ECM</li> </ul>	N END YGEN SE		er the following condition.
YES > NO > B.CHECH	<ul> <li>&gt; INSPECTION</li> <li>&gt; GO TO 3.</li> <li>&lt; HEATED OX<sup>1</sup></li> <li>voltage between</li> <li>ECM</li> </ul>	N END YGEN SE	harness connector terminals unde	
YES > NO > 3.CHECH Check the	<ul> <li>&gt; INSPECTION</li> <li>&gt; GO TO 3.</li> <li>&lt; HEATED OX<sup>1</sup></li> <li>voltage between</li> <li>ECM</li> </ul>	N END YGEN SE en ECM	harness connector terminals unde	
YES > NO > CHECI Check the Connector	<ul> <li>&gt; INSPECTION</li> <li>&gt; GO TO 3.</li> <li>&lt; HEATED OX</li> <li>voltage between</li> <li>ECM</li> <li>+</li> <li>Terminal</li> <li>50</li> </ul>	N END YGEN SE en ECM Terminal 59	Condition	Voltage The voltage should be above 0.72V at least once during this procedure. The voltage should be below 0.46V at least once
YES > NO > CHECI Check the Connector F8 s the insp YES >	INSPECTION > GO TO 3. < HEATED OX voltage between ECM + Terminal 50 (HO2S2 signal)	N END YGEN SE en ECM Terminal 59 ormal?	Condition	Voltage The voltage should be above 0.72V at least once during this procedure. The voltage should be below 0.46V at least once
YES > NO > CHECI Check the Connector F8 <u>s the insp</u> YES > NO >	<ul> <li>&gt; INSPECTION</li> <li>&gt; GO TO 3.</li> <li>&lt; HEATED OX<sup>1</sup></li> <li>voltage between</li> <li>ECM</li> <li>+</li> <li>Terminal</li> <li>50 (HO2S2 signal)</li> <li>&gt; INSPECTION</li> </ul>	N END YGEN SE en ECM Terminal 59 ormal? N END	harness connector terminals under Condition Coasting from 80 km/h (50 MPH) in D position (CVT), 4th gear position (M/T)	Voltage The voltage should be above 0.72V at least once during this procedure. The voltage should be below 0.46V at least once
YES > NO > S.CHECI Check the Connector F8 S the insp YES > NO > S.CHECI	<ul> <li>&gt; INSPECTION</li> <li>&gt; GO TO 3.</li> <li>&lt; HEATED OX</li> <li>voltage between</li> <li>ECM</li> <li>ECM</li> <li>Ferminal</li> <li>50 (HO2S2 signal)</li> <li>Dection result not</li> <li>&gt; INSPECTION</li> <li>&gt; GO TO 4.</li> <li>ACE HEATED C</li> </ul>	N END YGEN SE en ECM Terminal 59 ormal? N END	harness connector terminals under Condition Coasting from 80 km/h (50 MPH) in D position (CVT), 4th gear position (M/T) SENSOR 2	Voltage The voltage should be above 0.72V at least once during this procedure. The voltage should be below 0.46V at least once
YES > NO > 3.CHECI Check the Connector F8 S the insp YES > NO > 4.REPLA Replace h CAUTION Discard in) onto Before	<ul> <li>INSPECTION</li> <li>GO TO 3.</li> <li>HEATED OX</li> <li>voltage between</li> <li>ECM</li> <li>ECM</li> <li>Terminal</li> <li>50 (HO2S2 signal)</li> <li>ection result not</li> <li>INSPECTION</li> <li>GO TO 4.</li> <li>CE HEATED Conservation</li> <li>any heated on</li> <li>a hard surfaction</li> <li>a hard surfaction</li> </ul>	N END YGEN SE en ECM Terminal 59 DITMAI? N END DXYGEN Sensor 2. xygen so r oxygen so	harness connector terminals unde Condition Coasting from 80 km/h (50 MPH) in D position (CVT), 4th gear position (M/T) SENSOR 2 ensor which has been dropped as a concrete floor; use a new o	Voltage The voltage should be above 0.72V at least once during this procedure. The voltage should be below 0.46V at least once during this procedure. f from a height of more than 0.5 m (19.
YES > NO > B.CHECI Check the Connector F8 S the insp YES > NO > L.REPLA Replace h CAUTION Discard in) onto Before Cleaner	<ul> <li>INSPECTION</li> <li>GO TO 3.</li> <li>HEATED OX</li> <li>voltage between</li> <li>ECM</li> <li>ECM</li> <li>Terminal</li> <li>50 (HO2S2 signal)</li> <li>ection result not</li> <li>INSPECTION</li> <li>GO TO 4.</li> <li>CE HEATED Conservation</li> <li>any heated on</li> <li>a hard surfaction</li> <li>a hard surfaction</li> </ul>	N END YGEN SE en ECM Terminal 59 Drmal? N END DXYGEN Sensor 2. xygen se e such a roxygen se oxygen se	harness connector terminals unde Condition Coasting from 80 km/h (50 MPH) in D position (CVT), 4th gear position (M/T) SENSOR 2 ensor which has been dropped as a concrete floor; use a new o	Voltage The voltage should be above 0.72V at least once during this procedure. The voltage should be below 0.46V at least once during this procedure. f from a height of more than 0.5 m (19. ne. threads using Oxygen Sensor Thread

021-62999292

021-62999292

### P1147 HO2S2

#### < COMPONENT DIAGNOSIS >

### P1147 HO2S2

### Description

The heated oxygen sensor 2, after three way catalyst (manifold), monitors the oxygen level in the exhaust gas on each bank.

Even if switching characteristics of the heated oxygen sensor 1 are shifted, the air-fuel ratio is controlled to stoichiometric, by the signal from the heated oxygen sensor 2.

This sensor is made of ceramic zirconia. The zirconia generates voltage from approximately 1V in richer conditions to 0V in leaner conditions.

Under normal conditions the heated oxygen sensor 2 is not used for engine control operation.

### DTC Logic



#### INFOID:000000004899963

#### DTC DETECTION LOGIC

The heated oxygen sensor 2 has a much longer switching time between rich and lean than the heated oxygen sensor 1. The oxygen storage capacity before the three way catalyst (manifold) causes the longer switching time. To judge the malfunctions of heated oxygen sensor 2, ECM monitors whether the maximum voltage of the sensor is sufficiently high during the various driving condition such as fuelcut.



	<u>cin o mo</u>	بردت د ب
		1 H - 2

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1146	Heated oxygen sensor 2 maximum voltage moni- toring	The maximum voltage from the sensor is not reached to the specified voltage.	<ul> <li>Harness or connectors</li> <li>(The sensor circuit is open or shorted)</li> <li>Heated oxygen sensor 2</li> <li>Fuel pressure</li> <li>Fuel injector</li> <li>Intake air leaks</li> </ul>

### Component Function Check

INFOID.00000004899964

021-62999292

#### **1.**PERFORM COMPONENT FUNCTION CHECK-I

1. Start engine and warm it up to the normal operating temperature.

2. Turn ignition switch OFF and wait at least 10 seconds.

3. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.

4. Let engine idle for 1 minute.

5. Check the voltage between ECM harness connector terminals under the following condition.

	ECM			*
Connector	+	•	Condition	Voltage
Connector	Terminal	Terminal		
F8	50 (HO2S2 signal)	59	Revving up to 4,000 rpm under no load at least 10 times	The voltage should be above 0.72 V at least once during this procedure.
Is the insp	ection result no	ormal?		-
1	> INSPECTIOI > GO TO 2.	N END		

[MR20DE]

INFOID:00000000489996

Holder

www.digitalkhodro.com

### P1147 HO2S2

www.digitalkhodro.com

[MR20DE]

А

#### < COMPONENT DIAGNOSIS >

### 2.PERFORM COMPONENT FUNCTION CHECK-II

Check the voltage between ECM harness connector terminals under the following condition.

	ECM			r
Connector	+	-	Condition	Voltage
Johneului	Terminal	Terminal		
F8	50 (HÒ2S2 signal)	59	Keeping engine speed at idle for 10 minutes	The voltage should be above 0.72 V at least once during this procedure.
the insp	ection result n	ormal?	· · · · · · · · · · · · · · · · · · ·	
	> INSPECTIO	N END		
	> GO TO 3.			
.PERFC	RM COMPON	NENT FU	NCTION CHECK-III	
neck the	voltage betwe	en ECM	hamess connector terminals u	under the following condition.
-			·	·
	ECM		· ·	
`oppostor	+	-	Condition	- Voltage
Connector	Terminal	Terminal		1
F8	50 (HO2S2 signal)	59	Coasting from 80 km/h (50 MPH) ir position (CVT), 4th gear position (N	
the insp	ection result n	ormal?		6
	> INSPECTIO			
			osis Procedure".	
aunos	is Procedu	re		N/ECIO-0000004889955
agnos	is Procedu	re dulolu		INFOID:000000004899985
ت مح	IS Procedu		ت دیجیتال خودرور ION	INFOID:00000004899965
CHECK		ONNECT	ت دیجیتال خودرور ION	INFOID:00000004899965
CHECH	GROUND C	ONNECT	مت التربي بمرتا والسنة	INFOID:00000004899965
CHECH Turn i Chech	GROUND C	ONNECT OFF. ection E2	مت التربي بمرتا والسنة	شرک
CHECH Turn i Chech the insp	( GROUND Co gnition switch ground conne ection result n > GO TO 2.	ONNECT OFF. ection E2 ormal?	1 and E38. Refer to Ground Ir	شرک
CHECH Turn i Chech the insp ES > IO >	GROUND Constitution switch ground connection result n > GO TO 2. > Repair or re	ONNECT OFF. ection E2 ormal? place gro	1 and E38. Refer to Ground Ir	شرک
CHECH Turn i Chech the insp (ES > NO > .CLEAF	GROUND Constraints (Ground constraints) (Ground constraints) (Constraint	ONNECT OFF. ection E2 ormal? place gro EARNING	1 and E38. Refer to Ground In und connection.	nspection in <u>GI-40, "Circuit Inspection"</u> .
CHECH Turn i Check the insp 'ES > IO > .CLEAF Clear	GROUND Constraints (GROUND Constraints) (GROUND CONST (GROUND CON	ONNECT OFF. ection E2 ormal? place gro EARNING self-lear	1 and E38. Refer to Ground Ir und connection. S DATA hing value, refer to <u>EC-16.</u>	شرک
CHECH Turn i Check the insp ES > IO > .CLEAF Clear <u>CLEA</u>	GROUND Constraints (GROUND Constraints) (Ground constraints) (GO TO 2. (Constraints) (	ONNECT OFF. ection E2 ormal? place gro EARNINC self-learn pair Requ	1 and E38. Refer to Ground Ir und connection. DATA hing value, refer to <u>EC-16.</u>	nspection in <u>GI-40, "Circuit Inspection"</u> .
CHECH Turn i Chech the insp ES > CLEAF Clear <u>CLEA</u> Run e	GROUND Constraints (GROUND Constraints) (Ground constraints) (GO TO 2. (Section result in (Section result in	ONNECT OFF. ection E2 ormal? place gro EARNING self-learn pair Requ ast 10 min	1 and E38. Refer to Ground In und connection. B DATA hing value, refer to <u>EC-16, uirement"</u> . hutes at idle speed.	spection in <u>GI-40, "Circuit Inspection"</u> .
CHECH Turn i Chech the insp ES > IO > CLEAF Clear Clear CLEA Run e the 1st f	GROUND Constraints (GROUND Constraints) (Ground constraints) (GO TO 2.) > GO TO 2. > Repair or re Constraints) (Co	ONNECT OFF. ection E2 ormal? place gro EARNING self-learn pair Requ ast 10 min 1 detecte	1 and E38. Refer to Ground In und connection. B DATA hing value, refer to <u>EC-16, uirement".</u> hutes at idle speed. d? Is it difficult to start engine	Inspection in <u>GI-40, "Circuit Inspection"</u> .
CHECH Turn i Check the insp 'ES > IO > CLEAF Clear <u>CLEA</u> Run e the 1st f	GROUND Constraints (GROUND Constraints) (Ground constraints) (GO TO 2.) > GO TO 2. > Repair or re Constraints) (Co	ONNECT OFF. ection E2 ormal? place gro EARNING self-learn pair Requ ast 10 min 1 detecte	1 and E38. Refer to Ground In und connection. B DATA hing value, refer to <u>EC-16, uirement"</u> . hutes at idle speed.	Inspection in <u>GI-40, "Circuit Inspection"</u> .
CHECH Turn i Check the insp ES > IO > CLEAF Clear <u>CLEA</u> Run e the 1st f ES > IO >	GROUND Constraints (GROUND Constraints) (Ground constraints) (GRO TO 2.) (Constraints)	ONNECT OFF. ection E2 ormal? place gro EARNING self-learn pair Requ ast 10 min 1 detecte uble diagr	1 and E38. Refer to Ground In und connection. E DATA hing value, refer to <u>EC-16, uirement"</u> . hutes at idle speed. d? Is it difficult to start engine? hosis for DTC P0171. Refer to	MIXTURE RATIO SELF-LEARNING VALUE
CHECH Turn i Check the insp (ES > IO > CLEAR Clear <u>CLEA</u> Run e the 1st f (ES > IO >	C GROUND Co gnition switch ground connection ection result n > GO TO 2. > Repair or re THE SELF-L mixture ratio R : Special Re ingine for at le trip DTC P017 > Perform trou > GO TO 3. C HO2S2 GRO	ONNECT OFF. ection E2 ormal? place gro EARNING self-learn pair Requ ast 10 min 1 detecte uble diagr	1 and E38. Refer to Ground In und connection. B DATA hing value, refer to <u>EC-16, uirement".</u> hutes at idle speed. d? Is it difficult to start engine	MIXTURE RATIO SELF-LEARNING VALUE
CHECH Turn i Check the insp ES > IO > CLEAR Clear <u>CLEA</u> Run e the 1st i 'ES > IO > .CHECH Turn i	C GROUND Co gnition switch ground connection ection result n > GO TO 2. > Repair or re THE SELF-L mixture ratio R : Special Re ingine for at le trip DTC P017 > Perform trou > GO TO 3. C HO2S2 GRO gnition switch	ONNECT OFF. ection E2 ormal? place gro EARNING self-learn pair Requ ast 10 min 1 detecte uble diagr OUND CIF	and E38. Refer to Ground Ir und connection. DATA hing value, refer to <u>EC-16.</u> <u>uirement".</u> nutes at idle speed. <u>d? Is it difficult to start engine</u> nosis for DTC P0171. Refer to RCUIT FOR OPEN AND SHO	Inspection in <u>GI-40, "Circuit Inspection"</u> . <u>"MIXTURE RATIO SELF-LEARNING VALUE</u> <u>C EC-129, "DTC Logic"</u> . RT
CHECH Turn i Chech the insp (ES > IO > CLEAF Clear CLEAF Clear CLEA Run e the 1st f (ES > IO > IO > CHECH Turn i Disco Disco	CGROUND Co gnition switch ground conne- ection result n > GO TO 2. > Repair or re THE SELF-L mixture ratio R : Special Re ingine for at le trip DTC P017 > Perform trou > GO TO 3. CHO2S2 GRO gnition switch nnect heated on nect ECM ha	ONNECT OFF. ection E2 ormal? place gro EARNINC self-learn pair Requ ast 10 min 1 detecte uble diagr OUND CIF OFF. oxygen se mess cor	and E38. Refer to Ground Ir und connection. DATA hing value, refer to <u>EC-16.</u> <u>uirement".</u> nutes at idle speed. <u>d? Is it difficult to start engine</u> nosis for DTC P0171. Refer to RCUIT FOR OPEN AND SHO ensor (HO2S) 2 harness connu-	mspection in <u>GI-40, "Circuit Inspection"</u> . <u>"MIXTURE RATIO SELF-LEARNING VALUE</u> <u>C EC-129, "DTC Logic"</u> . RT ector.
CHECH Turn i Chech the insp (ES > IO > CLEAF Clear CLEAF Clear CLEA Run e the 1st f (ES > IO > IO > CHECH Turn i Disco Disco	CGROUND Co gnition switch ground conne- ection result n > GO TO 2. > Repair or re THE SELF-L mixture ratio R : Special Re ingine for at le trip DTC P017 > Perform trou > GO TO 3. CHO2S2 GRO gnition switch nnect heated on nect ECM ha	ONNECT OFF. ection E2 ormal? place gro EARNINC self-learn pair Requ ast 10 min 1 detecte uble diagr OUND CIF OFF. oxygen se mess cor	and E38. Refer to Ground Ir und connection. DATA ning value, refer to <u>EC-16.</u> <u>uirement".</u> nutes at idle speed. <u>d? Is it difficult to start engine</u> nosis for DTC P0171. Refer to RCUIT FOR OPEN AND SHO	mspection in <u>GI-40, "Circuit Inspection"</u> . <u>"MIXTURE RATIO SELF-LEARNING VALUE</u> <u>C EC-129, "DTC Logic"</u> . RT ector.
CHECH Turn i Check the insp (ES > IO > CLEAF Clear <u>CLEA</u> Run e the 1st i (ES > IO > CHECH Turn i Disco Disco Check	C GROUND Co gnition switch ground connection ection result n > GO TO 2. > Repair or re THE SELF-L mixture ratio R : Special Re ingine for at le trip DTC P017 > Perform trou > GO TO 3. C HO2S2 GRO gnition switch nnect heated on nect ECM ha c the continuity	ONNECT OFF. ection E2 ormal? place gro EARNING self-learn pair Requ ast 10 min 1 detecte uble diagr OUND CIF OFF. oxygen se mess cor y betweer	1 and E38. Refer to Ground In und connection. a DATA hing value, refer to <u>EC-16.</u> <u>uirement".</u> hutes at idle speed. <u>d? Is it difficult to start engine</u> hosis for DTC P0171. Refer to RCUIT FOR OPEN AND SHO ensor (HO2S) 2 harness connector. h HO2S2 harness connector a	mspection in <u>GI-40, "Circuit Inspection"</u> . <u>"MIXTURE RATIO SELF-LEARNING VALUE</u> <u>C EC-129, "DTC Logic"</u> . RT ector.
CHECH Turn i Check the insp (ES > ICLEAR Clear Clear CLEAR Run e the 1st i (ES > ICHECH Turn i Disco Disco Check	GROUND Constraints (GROUND Constraints) (Ground connection result in Section result in Constraints) (Constraints)	ONNECT OFF. ection E2 ormal? place gro EARNING self-learn pair Requ ast 10 min 1 detecte uble diagr OUND CIF OFF. oxygen se mess cor y betweer	1 and E38. Refer to Ground In und connection. a DATA ming value, refer to <u>EC-16</u> , <u>uirement"</u> . mutes at idle speed. <u>d? Is it difficult to start engine</u> mosis for DTC P0171. Refer to RCUIT FOR OPEN AND SHO ensor (HO2S) 2 harness connector a mector.	mspection in <u>GI-40, "Circuit Inspection"</u> . <u>"MIXTURE RATIO SELF-LEARNING VALUE</u> <u>C EC-129, "DTC Logic"</u> . RT ector.
.CHECH Turn i Check the insp (ES > NO > .CLEAF Clear <u>CLEA</u> Run e the 1st i (ES > NO > .CHECH Turn i Disco Disco Check	GROUND Constraints (GROUND Constraints) (Ground connection result in Section result in Constraints) (Constraints)	ONNECT OFF. ection E2 ormal? place gro EARNING self-learn pair Requ ast 10 min 1 detecte uble diagr OUND CIF OFF. oxygen se mess cor y betweer	1 and E38. Refer to Ground In und connection. a DATA hing value, refer to <u>EC-16.</u> <u>uirement".</u> hutes at idle speed. <u>d? Is it difficult to start engine</u> hosis for DTC P0171. Refer to RCUIT FOR OPEN AND SHO ensor (HO2S) 2 harness connector. h HO2S2 harness connector a	mspection in <u>GI-40, "Circuit Inspection"</u> . <u>"MIXTURE RATIO SELF-LEARNING VALUE</u> <u>C EC-129, "DTC Logic"</u> . RT ector.
CHECH Turn i Check the insp (ES > NO > .CLEAF Clear <u>CLEA</u> Run e the 1st f (ES > NO > .CHECH Turn i Disco Disco Check HC	GROUND Constraints (GROUND Constraints) (Ground connection result in Section result in Constraints) (Constraints)	ONNECT OFF. ection E2 ormal? place gro EARNING self-learn pair Requ ast 10 min 1 detecte uble diagr OUND CIF OFF. oxygen se mess cor y betweer	1 and E38. Refer to Ground In und connection. a DATA ming value, refer to <u>EC-16</u> , <u>uirement"</u> . mutes at idle speed. <u>d? Is it difficult to start engine</u> mosis for DTC P0171. Refer to RCUIT FOR OPEN AND SHO ensor (HO2S) 2 harness connector a mector. hO2S2 harness connector a	mspection in <u>GI-40, "Circuit Inspection"</u> . <u>"MIXTURE RATIO SELF-LEARNING VALUE</u> <u>C EC-129, "DTC Logic"</u> . RT ector.

www.	diaita	Ikhod	lro.com

com

	> GO TO	AGNOSIS	-			[MR2
NO >:	> GO TO 4					•
4.DETEC	T MALFU	NCTIONIN	g part	۰. ۱		,
Check the					· · · · · · · · · · · · · · · · · · ·	
		rs E7, F121 or short bet		ed oxyge	n sensor 2 and ECM.	
11471000				cu oxyge		
>	> Repair c	pen circuit	or short to	ground c	or short to power in harr	ness or connectors.
5.CHECH	K HO2S2 I	NPUT SIG	NAL CIRC	UIT FOR	OPEN AND SHORT	
1. Check	the contin	nuity betwe	en HO2S2	harness	connector and ECM ha	irness connector.
					-	
HO	2S2 Terminal	EC		Continuity		· · · · ·
E58	4	Connector F8	Terminal 50	Existed	-	ŀ
					- connector or ECM barr	ness connector and ground.
L. 011001		laity betwe		. nameoo		
HO	282	E	СМ	Ground	Continuity	,
Connector	Terminal	Connector	Terminal		Continuity	ŗ
E58	4	F8 ess for sho	50	Ground	Not existed	
NO > 6.DETEC	following.	6. INCTIONIN		•• نال خو	شرکت دیجین	
NO > 6.DETEC Check the Harness Harness	> GO TO CT MALFU following connecto for open	6. INCTIONIN rs E7, F121 or short bet	l ween heat	ted oxyge	n sensor 2 and ECM.	ness or connectors.
NO > 6.DETEC Check the Harness Harness	> GO TO CT MALFU following. connecto for open	6. INCTIONIN rs E7, F121 or short bet	ween hear	ted oxyge	n sensor 2 and ECM. or short to power in har	ness or connectors.
NO > 6.DETEC • Harness • Harness > 7.CHEC	> GO TO CT MALFU following. connecto for open > Repair o K HEATEE	6. INCTIONIN rs E7, F12 or short bet	or short to	ted oxyge o ground o 2		ness or connectors.
NO > 6.DETEC Check the Harness Harness 7.CHEC Refer to <u>E</u> Is the insp	<ul> <li>&gt; GO TO</li> <li>CT MALFU</li> <li>following.</li> <li>connecto</li> <li>for open</li> <li>&gt; Repair of</li> <li>K HEATED</li> <li>C-190, "C</li> <li>pection res</li> </ul>	6. INCTIONIN rs E7, F12 or short bet open circuit OOXYGEN omponent ult normal?	or short to SENSOR	ted oxyge o ground o 2		ness or connectors.
NO > 6.DETEC Check the Harness Harness 7.CHEC Refer to <u>E</u> Is the insp YES >	<ul> <li>&gt; GO TO</li> <li>CT MALFU</li> <li>following.</li> <li>connecto</li> <li>for open</li> <li>&gt; Repair of</li> <li>K HEATEI</li> <li>C-190, "C</li> <li>pection res</li> <li>&gt; GO TO</li> </ul>	6. INCTIONIN rs E7, F12 or short bet open circuit OOXYGEN omponent ult normal? 8.	or short to SENSOR	ted oxyge o ground o 2		ness or connectors.
NO > 6.DETEC Check the Harness Harness 7.CHECI Refer to <u>E</u> Is the insp YES > NO >	<ul> <li>&gt; GO TO</li> <li>CT MALFU</li> <li>following.</li> <li>connecto</li> <li>for open</li> <li>&gt; Repair (</li> <li>K HEATEU</li> <li>C-190, "C</li> <li>ection res</li> <li>&gt; GO TO</li> <li>&gt; Replace</li> </ul>	6. INCTIONIN rs E7, F12 or short bet open circuit OOXYGEN omponent ult normal?	or short to SENSOR	ted oxyge o ground o 2		ness or connectors.
NO > 6.DETEC Check the Harness Harness 7.CHECI Refer to <u>E</u> Is the insp YES > NO > 8.CHECI	<ul> <li>&gt; GO TO</li> <li>CT MALFU</li> <li>following.</li> <li>connecto</li> <li>for open</li> <li>&gt; Repair of</li> <li>× HEATEE</li> <li>C-190, "C</li> <li>&gt; GO TO</li> <li>&gt; Replace</li> <li>K INTERM</li> </ul>	6. INCTIONIN rs E7, F12 or short bet open circuit OOXYGEN omponent ult normal? 8. e heated ox	or short to SENSOR Inspection ygen sens	ted oxyge o ground o 2		ness or connectors.
NO $>$ 6.DETEC Check the Harness Harness 7.CHEC Refer to E Is the insp YES $>$ NO $>$ 8.CHEC Refer to G	<ul> <li>&gt; GO TO</li> <li>CT MALFU</li> <li>following.</li> <li>connecto</li> <li>for open</li> <li>&gt; Repair of</li> <li>× Repair of</li> <li>× Repair of</li> <li>× Repair of</li> <li>× Repair of</li> <li>&gt; Repair of</li> <li>× Repair of</li> <li>&gt; Repair of</li> <li>× Repair of</li>     &lt;</ul>	6. INCTIONIN rs E7, F12 or short bet open circuit OOXYGEN omponent ult normal? 8. e heated ox IITTENT IN rmittent Inc	or short to SENSOR Inspection ygen sens ICIDENT	ted oxyge o ground o 2		ness or connectors.
NO > 6.DETEC Check the Harness Harness 7.CHEC Refer to E Is the insp YES > NO > 8.CHEC Refer to C	<ul> <li>&gt; GO TO</li> <li>CT MALFU</li> <li>following.</li> <li>connecto</li> <li>for open</li> <li>&gt; Repair of</li> <li>× Repair of</li> <li>K HEATED</li> <li>C-190, "C</li> <li>C-190, "C</li> <li>&gt; GO TO</li> <li>&gt; SO TO</li> <l< td=""><td>6. INCTIONIN rs E7, F12 or short bet open circuit OOXYGEN OMPONENT 8. e heated ox IITTENT IN rmittent Inc</td><td>or short to SENSOR Inspection ygen sens ICIDENT</td><td>ted oxyge o ground o 2</td><td></td><td>ness or connectors.</td></l<></ul>	6. INCTIONIN rs E7, F12 or short bet open circuit OOXYGEN OMPONENT 8. e heated ox IITTENT IN rmittent Inc	or short to SENSOR Inspection ygen sens ICIDENT	ted oxyge o ground o 2		ness or connectors.
NO > 6.DETEC Check the Harness Harness 7.CHEC Refer to E Is the insp YES > NO > 8.CHEC Refer to C	<ul> <li>&gt; GO TO</li> <li>CT MALFU</li> <li>following.</li> <li>connecto</li> <li>for open</li> <li>&gt; Repair of</li> <li>× Repair of</li>     &lt;</ul>	6. INCTIONIN rs E7, F12 or short bet open circuit OOXYGEN OMPONENT 8. e heated ox IITTENT IN rmittent Inc	or short to SENSOR Inspection ygen sens ICIDENT	ted oxyge o ground o 2		ness or connectors.
NO > 6.DETEC Check the Harness Harness 7.CHEC Refer to E Is the insp YES > NO > 8.CHEC Refer to C S Compor	<ul> <li>&gt; GO TO</li> <li>CT MALFU</li> <li>following.</li> <li>connecto</li> <li>for open</li> <li>&gt; Repair of</li> <li>&gt; Repair of</li> <li>&lt; HEATED</li> <li>C-190, "C</li> <li>Dection res</li> <li>&gt; GO TO</li> <li>&gt; Replace</li> <li>K INTERM</li> <li>&gt; INSPEC</li> <li>nent Ins</li> </ul>	6. INCTIONIN rs E7, F12 or short bet open circuit OOXYGEN OMPONENT 8. e heated ox IITTENT IN rmittent Inc	or short to SENSOR Inspection ygen sens ICIDENT	ted oxyge		
NO > 6.DETEC Check the Harness Harness 7.CHEC Refer to E Is the insp YES > NO > 8.CHEC Refer to G Compor 1.CHEC	<ul> <li>&gt; GO TO</li> <li>&gt; TMALFU</li> <li>following.</li> <li>connecto</li> <li>for open</li> <li>&gt; Repair (</li> <li>K HEATEL</li> <li>C-190, "C</li> <li>&gt; GO TO</li> <li>&gt; Replace</li> <li>K INTERM</li> <li>&gt; INSPEC</li> <li>nent Ins</li> <li>K HEATEL</li> <li>engine and</li> </ul>	6. INCTIONIN rs E7, F12 or short bet open circuit OOXYGEN omponent ult normal? 8. e heated ox IITTENT IN rmittent Inc CTION END pection OOXYGEN	or short to SENSOR Inspection ygen sens CIDENT cident"	ted oxyge o ground o 2 	or short to power in har	

021-62999292

### P1147 HO2S2

## www.digitalkhodro.com

[MR20DE]

### < COMPONENT DIAGNOSIS >

	ECM			· · ·
onnector	+	-	Condition	Voltage
F8	50 50 (HO2S2 signal)	Terminal	Revving up to 4,000 rpm under no load at least 10 times	The voltage should be above 0.72V at least once during this procedure. The voltage should be below 0.46V at least once during this procedure.
the insp	ection result no	ormal?		
10 >	> INSPECTIOI > GO TO 2. ( HEATED OX)		ENSOR 2-II	
			harness connector terminals unde	er the following condition.
	ECM			
	.+	<b>-</b> .	Condition	Voltage
onnector	Terminal	Terminal		
F8	50 (HO2S2 signal)	59	Keeping engine speed at idle for 10 minutes	The voltage should be above 0.72V at least once during this procedure. The voltage should be below 0.46V at least once during this procedure.
ES > O > CHECK	ection result no > INSPECTION > GO TO 3. ( HEATED OX) voltage betwe	N END YGEN SI	In Man Illing I Milling	er the following condition.
ES > IO > .CHECK	> INSPECTION > GO TO 3. ( HEATED OX) voltage betwe	N END YGEN SI		er the following condition.
ES > IO > .CHECK	> INSPECTION > GO TO 3. ( HEATED OX) voltage betwe ECM	N END YGEN SI	ENSOR 2-III hamess connector terminals unde	
ES > IO > CHECk heck the	> INSPECTION > GO TO 3. ( HEATED OX) voltage betwe ECM +	N END YGEN SI en ECM	ENSOR 2-III	er the following condition. Voltage
YES > IO > .CHECK	> INSPECTION > GO TO 3. ( HEATED OX) voltage betwe ECM	N END YGEN SI	ENSOR 2-III hamess connector terminals unde	
ES > IO > CHECK heck the connector F8	> INSPECTION > GO TO 3. ( HEATED OX) voltage betwe ECM + Terminal 50 (HO2S2 signal) ection result networks)	N END YGEN SI en ECM Terminal 59 ormal?	ENSOR 2-III harness connector terminals unde Condition Coasting from 80 km/h (50 MPH) in D	Voltage The voltage should be above 0.72V at least once during this procedure. The voltage should be below 0.46V at least once
ES > IO > IO > IO > IO > IO > IO POINT IN IONT IONT	> INSPECTION > GO TO 3. (HEATED OX) voltage betwe ECM + Terminal 50 (HO2S2 signal)	N END YGEN SI en ECM Terminal 59 ormal?	ENSOR 2-III harness connector terminals unde Condition Coasting from 80 km/h (50 MPH) in D	Voltage The voltage should be above 0.72V at least once during this procedure. The voltage should be below 0.46V at least once
ES > O > CHECk eck the onnector F8 the insp ES > O >	> INSPECTION > GO TO 3. (HEATED OX) voltage betwe ECM + Terminal 50 (HO2S2 signal) ection result ne > INSPECTIO	N END YGEN SI en ECM Terminal 59 ormal? N END	ENSOR 2-III harness connector terminals under Condition Coasting from 80 km/h (50 MPH) in D position (CVT), 4th gear position (M/T)	Voltage The voltage should be above 0.72V at least once during this procedure. The voltage should be below 0.46V at least once
ES > O > CHECk eck the onnector F8 the insp ES > O > REPLA	> INSPECTION > GO TO 3. (HEATED OX) voltage betwe ECM + Terminal 50 (HO2S2 signal) ection result no > INSPECTION > GO TO 4. CE HEATED C eated oxygen s :	N END YGEN SI en ECM Terminal 59 ormal? N END DXYGEN sensor 2.	ENSOR 2-III harness connector terminals under Condition Coasting from 80 km/h (50 MPH) in D position (CVT), 4th gear position (M/T) SENSOR 2	Voltage The voltage should be above 0.72V at least once during this procedure. The voltage should be below 0.46V at least once during this procedure.
ES > O > CHECK heck the onnector F8 the insp ES > IO > REPLA Pplace h AUTION Discard n) onto Before	> INSPECTION > GO TO 3. (HEATED OX) voltage betwe ECM + Terminal 50 (HO2S2 signal) ection result new > INSPECTION > GO TO 4. CE HEATED C eated oxygen s : any heated o a hard surfactionstalling new	N END YGEN SI en ECM Terminal 59 ormal? N END OXYGEN sensor 2. xygen s c such a	ENSOR 2-III hamess connector terminals unde Condition Coasting from 80 km/h (50 MPH) in D position (CVT), 4th gear position (M/T) SENSOR 2 ensor which has been dropped as a concrete floor; use a new o a sensor, clean exhaust system	Voltage The voltage should be above 0.72V at least once during this procedure. The voltage should be below 0.46V at least once during this procedure. from a height of more than 0.5 m (19.7 me. threads using Oxygen Sensor Thread
ES > O > CHECK heck the onnector F8 the insp ES > IO > REPLA Place h AUTION Discard n) onto Before i Cleaner	> INSPECTION > GO TO 3. (HEATED OX) voltage betwe ECM + Terminal 50 (HO2S2 signal) ection result new > INSPECTION > GO TO 4. CE HEATED C eated oxygen s : any heated o a hard surfactionstalling new	N END YGEN SI en ECM Terminal 59 ormal? N END OXYGEN Sensor 2. oxygen s se such a roxygen s rcial serv	ENSOR 2-III hamess connector terminals unde Condition Coasting from 80 km/h (50 MPH) in D position (CVT), 4th gear position (M/T) SENSOR 2 ensor which has been dropped as a concrete floor; use a new o a sensor, clean exhaust system	Voltage The voltage should be above 0.72V at least once during this procedure. The voltage should be below 0.46V at least once during this procedure.

### P1211 TCS CONTROL UNIT

< COMPONENT DIAGNOSIS >

### P1211 TCS CONTROL UNIT

### Description

The malfunction information related to TCS is transferred through the CAN communication line from "ABS actuator and electric unit (control unit)" to ECM.

Be sure to erase the malfunction information such as DTC not only for "ABS actuator and electric unit (control unit)" but also for ECM after TCS related repair.

#### DTC Logic

DTC DETECTION LOGIC

Freeze frame data is not stored in the ECM for this self-diagnosis.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1211	TCS control unit	ECM receives a malfunction information from "ABS actuator and electric unit (control unit)".	<ul> <li>ABS actuator and electric unit (control unit)</li> <li>TCS related parts</li> </ul>

#### DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

TESTING CONDITION: Before performing the following procedure, confirm that battery voltage is more than 10.5V at idle.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

1. Start engine and let it idle for at least 60 seconds.

2. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> EC-192, "Diagnosis Procedure"

NO >> INSPECTION END

#### **Diagnosis** Procedure

Go to BRC-49, "Diagnostic Work Sheet".

021-62999292

## www.digitalkhodro.com

[MR20DE]

INFOID:000000004899957

INFOID.00000004899958

INFOID:000000004899



### P1212 TCS COMMUNICATION LINE

www.digitalkhodro.com

Control of the second of th		NENT DIAGNOSIS >			[MR20DE]
his CAN communication line is used to control the smooth engine operation during the TCS operation. If grais are exchanged between ECM and "ABS actuator and electric unit (control unit)". e sure to erase the malfunction information such as DTC not only for "ABS actuator and electric ontrol unit)" but also for ECM after TCS related repair. TC Logic ""CONTROLLING CONTROLLING CONTROL CONTROLLING CONTROLLING CONTROL CONTROL CONTROL CONTROL CONTROL	1212 T	CS COMMUNI	CATION LINE	6	<u>.</u>
gnals are exchanged between ECM and "ABS actuator and electric unit (control unit)". e sure to erase the malfunction information such as DTC not only for "ABS actuator and electric ontrol unit)" but also for ECM after TCS related repair. TC Logic TC DETECTION LOGIC OTE: If DTC P1212 is displayed with DTC U1000 or U1001, first perform the trouble diagnosis for U1000, U1001. Refer to <u>EC-87. "DTC Logic"</u> . If DTC P1212 is displayed with DTC U1010, first perform the trouble diagnosis for DTC U1010. F to <u>EC-88. "DTC Logic"</u> . receze frame data is not stored in the ECM for this self-diagnosis. DTC No. Trouble diagnosis name DTC detecting condition Possible cause - Harmess or connectors (The CAN communication line "ABS actuator and electric unit (control un "ABS actuator and electric unit (control un "Dead (Weak) battery TC CONFIRMATION PROCEDURE .PRECONDITIONING ESTING CONDITION: efore performing the following procedure, confirm that battery voltage is more than 10.5V at idle .PERFORM DTC CONFIRMATION PROCEDURE .PERFORM DTC CONFIRMATION PROCEDURE .Start engine and let it idle for at least 10 seconds. Check 1st trip DTC. .1st trip DTC detected? YES >> Go to EC-193. "Diagnosis Procedure". NO >> INSPECTION END inagnosis Procedure	escripti	on			INFOID:000000004899970
control unit)" but also for ECM after TCS related repair.         TC Logic         TC DETECTION LOGIC         DTE:         f DTC P1212 is displayed with DTC U1000 or U1001, first perform the trouble diagnosis for DTC U1010. First perform the trouble diagnosis for DTC U1010. Fits to EC-83. "DTC Logic".         if DTC P1212 is displayed with DTC U1010, first perform the trouble diagnosis for DTC U1010. Fits to EC-88. "DTC Logic".         if DTC P1212 is displayed with DTC U1010, first perform the trouble diagnosis for DTC U1010. Fits to EC-88. "DTC Logic".         eeze frame data is not stored in the ECM for this self-diagnosis.         DTC No.       Trouble diagnosis name         TCS communication line       ECM can not receive the information from "ABS actuator and electric unit (control unit)" continuously.         *1212       TCS communication line         *ABS actuator and electric unit (control unit)" continuously.       • Harress or connectors (The CAN communication line is open or sed.).         *1212       TCS communication line       * CM communication line is open or sed.).         *ABS actuator and electric unit (control unit)" continuously.       • Harress or connectors (The AL (Weak) battery         TC CONFIRMATION PROCEDURE       • CONFIRMATION PROCEDURE       • Check 1st trip DTC.        PERFORM DTC CONFIRMATION PROCEDURE       • Check 1st trip DTC.       • Check 1st trip DTC.        spreceture       • So to EC-193. "Diagnosis Procedure".	inals are	exchanged between E	ECM and "ABS actuator and electric	c unit (control unit)".	
TC DETECTION LOGIC         OTE:         If DTC P1212 is displayed with DTC U1000 or U1001, first perform the trouble diagnosis for DTC U1010. First perform that battery connectors         DTC No.       Trouble diagnosis name       DTC detecting condition       Possible cause         >1212       ToS communication line       ECM can not receive the information from 'ABS actuator and electric unit (control unit)' continuously.       • Harness or connectors         >1212       ToS communication line       ECM can not receive the information from 'ABS actuator and electric unit (control unit)' continuously.       • Harness or connectors         TC CONFIRMATION PROCEDURE        • Bead (Weak) battery       • Dead (Weak) battery         PRECONDITIONING         • Dead (Weak) battery       • Dead (Weak) battery         PERFORM DTC CONFIRMATION PROCEDURE                 <	e sure to ontrol un	nit)" but also for ECN	after TCS related repair.		
OTE:       If DTC P1212 is displayed with DTC U1000 or U1001, first perform the trouble diagnosis for DTC U1010. Fit DTC P1212 is displayed with DTC U1010, first perform the trouble diagnosis for DTC U1010. Fit DTC P1212 is displayed with DTC U1010, first perform the trouble diagnosis for DTC U1010. Fit DTC P1212 is displayed with DTC U1010, first perform the trouble diagnosis for DTC U1010. Fit DTC P1212 is displayed with DTC U1010, first perform the trouble diagnosis for DTC U1010. Fit DTC P1212 is displayed with DTC U1010, first perform the trouble diagnosis for DTC U1010. Fit DTC Logic".         receze frame data is not stored in the ECM for this self-diagnosis.         DTC No.       Trouble diagnosis name         DTC No.       Trouble diagnosis name         DTC CS communication line       DTC detecting condition         * Harness or connectors       (The CAN communication line is open or set)         * CC CONFIRMATION PROCEDURE       • Harness or connectors         • PRECONDITIONING       • DTC CONFIRMATION PROCEDURE         • PERFORM DTC CONFIRMATION PROCEDURE       • Check 1st trip DTC.         • PERFORM DTC CONFIRMATION PROCEDURE       • Check 1st trip DTC.         • Start engine and let it idle for at least 10 seconds.       • Check 1st trip DTC.         • Tst trip DTC detected?       YES >> Go to EC-193. "Diagnosis Procedure".         NO       >> INSPECTION END         • Magnosis Procedure       • Concourse	TC Log	ic			INFOID:000000004899971
If DTC P1212 is displayed with DTC U1000 or U1001, first perform the trouble diagnosis for U1000, U1001. Refer to EC-87, "DTC Logic".         If DTC P1212 is displayed with DTC U1010, first perform the trouble diagnosis for DTC U1010. Fits to EC-88, "DTC Logic".         reeze frame data is not stored in the ECM for this self-diagnosis.         DTC No.       Trouble diagnosis name         DTC No.       Trouble diagnosis name         DTC According       ECM can not receive the information from "ABS actuator and electric unit (control unit)" continuously.         P1212       TCS communication line         Control CONFIRMATION PROCEDURE       PRECONDITIONING         ESTING CONDITION:       effore performing the following procedure, confirm that battery voltage is more than 10.5V at idle         PIP >> GO TO 2.       Expression for at least 10 seconds.         Check 1st trip DTC detected?       '         YES       > Go to EC-193. "Diagnosis Procedure".         NO       > INSPECTION END         Pragnosis Procedure       ************************************	TC DETE	ECTION LOGIC			
to <u>EC-88. "DTC Logic"</u> reeze frame data is not stored in the ECM for this self-diagnosis. DTC No. Trouble diagnosis name DTC detecting condition Possible cause P1212 TCS communication line ECM can not receive the information from "ABS actuator and electric unit (control unit)" continuously. P1212 TCS communication line 'ABS actuator and electric unit (control unit)" continuously. P1212 TCS communication line 'ABS actuator and electric unit (control unit)" continuously. P1212 TCS communication line 'ABS actuator and electric unit (control unit)" continuously. P1212 TCS communication line 'ABS actuator and electric unit (control unit)" continuously. P1212 TCS communication line 'ABS actuator and electric unit (control unit) Dead (Weak) battery TC CONFIRMATION PROCEDURE .PRECONDITIONING ESTING CONDITION: effore performing the following procedure, confirm that battery voltage is more than 10.5V at idle .PERFORM DTC CONFIRMATION PROCEDURE .PERFORM DTC CONFIRMATION PROCEDURE .Start engine and let it idle for at least 10 seconds. . Check 1st trip DTC. detected? YES >> Go to <u>EC-193. "Diagnosis Procedure"</u> . NO >> INSPECTION END Piagnosis Procedure	If DTC P	1001. Refer to EC-87	" "DTC Logic".		
P1212       TCS communication line       ECM can not receive the information from "ABS actuator and electric unit (control unit)" continuously.       • Harness or connectors (The CAN communication line is open or sed.)         P1212       TCS communication line       ECM can not receive the information from "ABS actuator and electric unit (control unit)" continuously.       • Harness or connectors (The CAN communication line is open or sed.)         P1212       TCS communication line       ECM can not receive the information from "ABS actuator and electric unit (control unit)" continuously.       • Harness or connectors (The CAN communication line is open or sed.)         P1212       TCS communication line       ECM can not receive the information from "ABS actuator and electric unit (control unit)" continuously.       • Harness or connectors (The CAN communication line is open or sed.)         P1212       TCS communication line       ECM can not receive the information from "ABS actuator and electric unit (control un Dead (Weak) battery         TC CONFIRMATION PROCEDURE       • Dead (Weak) battery       • Dead (Weak) battery         PERFORM DTC CONFIRMATION PROCEDURE       • PERFORM DTC CONFIRMATION PROCEDURE         • Start engine and let it idle for at least 10 seconds.       • Check 1st trip DTC.         • 1st trip DTC detected?       * So to EC-193. "Diagnosis Procedure".         NO       >> INSPECTION END         Diagnosis Procedure       ************************************	to EC-88.	<u>, "DTC Logic"</u> .			
P1212       TCS communication line       ECM can not receive the information from "ABS actuator and electric unit (control unit)" continuously.       (The CAN communication line is open or sed.)         • ABS actuator and electric unit (control unit)" continuously.       • ABS actuator and electric unit (control unit)       • ABS actuator and electric unit (control unit)         • CONFIRMATION PROCEDURE       • ABS actuator and electric unit (control unit)       • Dead (Weak) battery         • PRECONDITIONING       • ABS actuator and electric unit (control unit)       • Dead (Weak) battery         • PRECONDITIONING       • ABS actuator and electric unit (control unit)       • Dead (Weak) battery         • PRECONDITIONING       • ABS actuator and electric unit (control unit)       • Dead (Weak) battery         • PREFORM DTC CONFIRMATION PROCEDURE       • Dead (Weak)       • Dead (Weak)         • PERFORM DTC CONFIRMATION PROCEDURE       • ABS actuator and electric unit (control unit)       • Dead (Weak)         • Start engine and let it idle for at least 10 seconds.       • Check 1st trip DTC.       • To action of the endition of the enditi	DTC No.	Trouble diagnosis name	DTC detecting condition	Possible	cause
TC CONFIRMATION PROCEDURE .PRECONDITIONING ESTING CONDITION: before performing the following procedure, confirm that battery voltage is more than 10.5V at idle .> GO TO 2. .PERFORM DTC CONFIRMATION PROCEDURE . Start engine and let it idle for at least 10 seconds. . Check 1st trip DTC. . 1st trip DTC detected? YES >> Go to EC-193. "Diagnosis Procedure". NO >> INSPECTION END Diagnosis Procedure	P1212	TCS communication line	"ABS actuator and electric unit (control	<ul><li>(The CAN communication ed.)</li><li>ABS actuator and electric</li></ul>	
PRECONDITIONING ESTING CONDITION: efore performing the following procedure, confirm that battery voltage is more than 10.5V at idle >> GO TO 2PERFORM DTC CONFIRMATION PROCEDURE Start engine and let it idle for at least 10 seconds. Check 1st trip DTC. 1st trip DTC detected? YES >> Go to EC-193. "Diagnosis Procedure". NO >> INSPECTION END itagnosis Procedure	TC CON	FIRMATION PROCI	FDURE		
PERFORM DTC CONFIRMATION PROCEDURE Start engine and let it idle for at least 10 seconds. Check 1st trip DTC. <u>s 1st trip DTC detected?</u> YES >> Go to <u>EC-193. "Diagnosis Procedure"</u> . NO >> INSPECTION END Diagnosis Procedure	ESTING (	CONDITION:	a procedure, confirm that battery	v voltage is more that	n 10.5V at idle.
PERFORM DTC CONFIRMATION PROCEDURE         Start engine and let it idle for at least 10 seconds.         Check 1st trip DTC.         s 1st trip DTC detected?         YES       >> Go to EC-193. "Diagnosis Procedure".         NO       >> INSPECTION END         Diagnosis Procedure       WEODOGOGOOCO					
Start engine and let it idle for at least 10 seconds. Check 1st trip DTC. <u>s 1st trip DTC detected?</u> YES >> Go to <u>EC-193. "Diagnosis Procedure"</u> . NO >> INSPECTION END Diagnosis Procedure				0	
<u>s 1st trip DTC detected?</u> YES >> Go to <u>EC-193. "Diagnosis Procedure"</u> . NO >> INSPECTION END	. Start ei	ngine and let it idle for		*	
YES >> Go to <u>EC-193. "Diagnosis Procedure"</u> . NO >> INSPECTION END Diagnosis Procedure					
Diagnosis Procedure	YES >>	- Go to EC-193. "Diag	nosis Procedure".		
to <u>BRC-49, "Diagnostic Work Sheet"</u> .	-				INFC/ID:000000004899972
	ao to <u>BRC</u>	-49, "Diagnostic Work	Sheet".		
		•			;
*			1	· · ·	

~

-

.

### P1217 ENGINE OVER TEMPERATURE

< COMPONENT DIAGNOSIS >

P1217 ENGINE OVER TEMPERATURE

DTC Logic

#### DTC DETECTION LOGIC

#### NOTE:

- If DTC P1217 is displayed with DTC U1000 or U1001, first perform the trouble diagnosis for DTC U1000, U1001. Refer to <u>EC-87, "DTC Logic"</u>.
- If DTC P1217 is displayed with DTC U1010, first perform the trouble diagnosis for DTC U1010. Refer to <u>EC-88, "DTC Logic"</u>.

If the cooling fan or another component in the cooling system malfunctions, engine coolant temperature will rise.

When the engine coolant temperature reaches an abnormally high temperature condition, a malfunction is indicated.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1217	Engine over tempera- ture (Overheat)	<ul> <li>Cooling fan does not operate properly (Overheat).</li> <li>Cooling fan system does not operate properly (Overheat).</li> <li>Engine coolant was not added to the system using the proper filling method.</li> <li>Engine coolant is not within the specified range.</li> </ul>	Cooling for relev

#### CAUTION:

When a malfunction is indicated, be sure to replace the coolant. Refer to <u>CO-30, "Draining"</u> and <u>CO-30,</u> <u>"Refilling"</u>. Also, replace the engine oil. Refer to <u>LU-15, "Draining"</u> and <u>LU-16, "Refilling"</u>.

- 1. Fill radiator with coolant up to specified level with a filling speed of 2 liters per minute. Be sure to use coolant with the proper mixture ratio. Refer to <u>MA-13</u>, "SAE Viscosity Number".
- 2. After refilling coolant, run engine to ensure that no water-flow noise is emitted.

#### DTC CONFIRMATION PROCEDURE

### 1.PERFORM COMPONENT FUNCTION CHECK

Perform component function check. Refer to EC-194, "Component Function Check".

#### NOTE:

Use component function check to check the overall function of the cooling fan. During this check, a DTC might not be confirmed.

#### Is the inspection result normal?

- YES >> INSPECTION END
- NO >> Go to EC-195, "Diagnosis Procedure".

#### Component Function Check

INFO/D;000000004899974

### 1.PERFORM COMPONENT FUNCTION CHECK-I

#### WARNING:

Never remove the reservoir tank cap when the engine is hot. Serious burns could be caused by high pressure fluid escaping from the radiator.

Wrap a thick cloth around cap. Carefully remove the cap by turning it a quarter turn to allow built-up pressure to escape. Then turn the cap all the way off.

[MR20DE]

INFOID-0000000004899973

### P1217 ENGINE OVER TEMPERATURE

#### www.digitalkhodro.com



### **P1217 ENGINE OVER TEMPERATURE**

www.digitalkhodro.com

		DIAGNOSIS >			[MR20DE]
Check cod	oling syst	em for leak. Refer to <u>C</u>	0-30, "Inspection".	<u> </u>	<u>_</u>
<u>Is leakage</u>					
	> GO TC > GO TC	-			
4.DETE	OT MALF	UNCTIONING PART			
	following	g for leak. Refer to CO-	30. "Inspection".		
<ul> <li>Hose</li> <li>Radiator</li> </ul>	r				
<ul> <li>Water p</li> </ul>					
<ul> <li>Reserve</li> </ul>		۵.		· ·	
	> Popair	or replace.			
_	•	RVOIR TANK CAP			• .
				· · · · · · · · · · · ·	
		nk cap. Refer to <u>CO-33</u> esult normal?	RESERVOIR IANI	CAP : Inspection".	
	>> GO TO				;
		ce reservoir tank cap.			
<b>6.</b> снес	-	•		· · ·	
Check the	ermostat.	Refer to CO-42. "Inspe	ction".		······
		esult normal?			
	>> GO TO				
		ce thermostat.		•	
		R CONTROL VALVE	•• • ••		
		ol valve. Refer to <u>CO-4</u>	5, "Inspection".		
	>> GO TO	esult normal?			
-		ce water control valve.			
<u> </u>		E COOLANT TEMPER	ATURE SENSOR	191 <b>- 1</b> 91	
		lant temperature sensor		Component Inspection"	
-	-	esuit normal?		service and out	
	>> GO T(				
		ce engine coolant temp	erature sensor.	• .•	
9.CHEC	K MAIN	13 CAUSES			
If the cau	se canno	t be isolated, check the	following.		······································
Engine	Step	Inspection item	Equipment	Standard	Reference page
OFF	1	Blocked radiator	Visual	No blocking	
		Blocked condenser     Blocked redictor critte			
		<ul> <li>Blocked radiator grille</li> <li>Blocked bumper</li> </ul>		· ·	
	2	Coolant mixture	Coolant tester	MA-13. "SAE Viscosity Nu	mber"

ON\*2

ON\*2

3

4

5

6

· Coolant level

· Coolant leaks

Thermostat

Reservoir tank cap

Visual

Visual

· Pressure tester

• Touch the upper and

lower radiator hoses

MA-13, "SAE Viscosity Number"

CO-33, "RESERVOIR TANK CAP : Inspection"

Coolant up to MAX level in

reservoir tank and radiator

Both hoses should be hot

filler neck

No leaks

CO-30, \*Inspection\*

CO-30, "Inspection"

CO-42. "Inspection"

### P1217 ENGINE OVER TEMPERATURE

www.digitalkhodro.com

#### < COMPONENT DIAGNOSIS >

[MR20DE]

G

Н

J

К

L

М

Ν

0

ρ

Engine	Step	Inspection item	Equipment	Standard	Reference page	
ON* <sup>1</sup>	7	Cooling fan motor	Auto active test	Operating	EC-242. "Component In- spection (Cooling Fan Molor)"	· ,
OFF	8	Combustion gas leak	Color checker chemical tester 4 Gas analyzer	Negative		E
ON* <sup>3</sup>	9	Coolant temperature     gauge	<ul> <li>Visual</li> </ul>	Gauge less than 3/4 when driving	<b>—</b>	С
		Coolant overflow to res- ervoir tank	• Visual	No overflow during driving and idling	CO-30, "Inspection"	
OFF*4	10	Coolant return from res- ervoir tank to radiator	Visual	Should be initial level in reservoir tank	CO-30, "Inspection"	Ē
OFF	11	Water control valve	Remove and inspect the valve	Within the specified value	CO-45, "Inspection"	Е
OFF	12	Cylinder head	<ul> <li>Straight gauge feeler gauge</li> </ul>	0.1 mm (0.004 in) Maxi- mum distortion (warping)	EM-193, "Inspection"	
	13	Cylinder block and pis- tons	• Visual	No scuffing on cylinder walls or piston	EM-221, "Inspection"	F

÷1

\*1: Turn the ignition switch ON. -

\*2: Engine running at 3,000 rpm for 10 minutes.

\*3: Drive at 90 km/h (55 MPH) for 30 minutes and then let idle for 10 minutes.

\*4: After 60 minutes of cool down time.

For more information, refer to CO-26, "Troubleshooting Chart".

#### >> INSPECTION END

021-62999292

021-62999292

#### P1225 TP SENSOR

#### < COMPONENT DIAGNOSIS >

P1225 TP SENSOR

### Description

Electric throttle control actuator consists of throttle control motor, throttle position sensor, etc. The throttle position sensor responds to the throttle valve movement.

The throttle position sensor has two sensors. These sensors are a kind of potentiometers which transform the throttle valve position into output voltage, and emit the voltage signal to the ECM. In addition, these sensors detect the opening and closing speed of the throttle valve and feed the voltage signals to the ECM. The ECM judges the current opening angle of the throttle valve from these signals and the ECM controls the throttle control motor to make the throttle valve opening angle properly in response to driving condition.

### DTC Logic

#### DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1225	Closed throttle position learning performance	Closed throttle position learning value is excessively low.	Electric throttle control actuator (TP sensor 1 and 2)

#### DTC CONFIRMATION PROCEDURE

#### 1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

#### **TESTING CONDITION:**

Before performing the following procedure, confirm that battery voltage is more than 10V at idle.

#### >> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

- 1. Turn ignition switch ON.
- 2. Turn ignition switch OFF and wait at least 10 seconds.
- 3. Turn ignition switch ON.
- 4. Check 1st trip DTC.

#### Is 1st trip DTC detected?

YES >> Go to <u>EC-198. "Diagnosis Procedure"</u>. NO >> INSPECTIÓN END

### Diagnosis Procedure

#### **1.**CHECK ELECTRIC THROTTLE CONTROL ACTUATOR VISUALLY

1. Turn ignition switch OFF.

2. Remove the intake air duct.



www.digitalkhodro.com

[MR20DE]

INFOID-00000004899976

INFOID:000000004899977

INFOID:000000004899978



021-62999292

### P1225 TP SENSOR

### www.digitalkhodro.com



#### P1226 TP SENSOR

< COMPONENT DIAGNOSIS >

### P1226 TP SENSOR

### Description

Electric throttle control actuator consists of throttle control motor, throttle position sensor, etc. The throttle position sensor responds to the throttle valve movement.

The throttle position sensor has two sensors. These sensors are a kind of potentiometers which transform the throttle valve position into output voltage, and emit the voltage signal to the ECM. In addition, these sensors detect the opening and closing speed of the throttle valve and feed the voltage signals to the ECM. The ECM judges the current opening angle of the throttle valve from these signals and the ECM controls the throttle control motor to make the throttle valve opening angle properly in response to driving condition.

### DTC Logic

#### DTC DETECTION LOGIC

DTC No. Trouble diagnosis name		DTC detecting condition	Possible cause
P1226	Closed throttle position	Closed throttle position learning is not per-	Electric throttle control actuator
	learning performance	formed successfully, repeatedly.	(TP sensor 1 and 2)

#### DTC CONFIRMATION PROCEDURE

### 1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

#### **TESTING CONDITION:**

Before performing the following procedure, confirm that battery voltage is more than 10V at idle.

#### >> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

- 1. Turn ignition switch ON.
- 2. Turn ignition switch OFF and wait at least 10 seconds.
- 3. Turn ignition switch ON.
- 4. Repeat steps 2 and 3 for 32 times.
- 5. Check 1st trip DTC:

#### Is 1st trip DTC detected?

YES >> Go to EC-200. "Diagnosis Procedure".

NO >> INSPECTION END

#### **Diagnosis Procedure**

INFOID:00000000489998

#### **1.**CHECK ELECTRIC THROTTLE CONTROL ACTUATOR VISUALLY

- 1. Turn ignition switch OFF.
- 2. Remove the intake air duct.

#### 

#### INFOID:000000004899981

[MR20DE]

INFOID:00000000489998

### P1226 TP SENSOR

### www.digitalkhodro.com



021-62999292

### P1229 SENSOR POWER SUPPLY

### < COMPONENT DIAGNOSIS >

P1229 SENSOR POWER SUPPLY

### DTC Logic

INFOID:000000004899984

INFOID:0000000048999

### DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
, P1229	Sensor power supply circuit short	ECM detects a voltage of power source for sensor is excessively low or high.	<ul> <li>Harness or connectors (APP sensor 1 circuit is shorted.) (TP sensor circuit is shorted.) [Camshaft position sensor (PHASE) circuit is shorted.]</li> <li>Accelerator pedal position sensor</li> <li>Throttle position sensor</li> <li>Camshaft position sensor (PHASE)</li> </ul>

#### DTC CONFIRMATION PROCEDURE

#### 1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

#### TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 10V at idle.

#### >> GO TO 2.

#### 2. PERFORM DTC CONFIRMATION PROCEDURE

- 1. Start engine and let it idle for 1 second.
- 2. Check DTC.

#### Is DTC detected?

YES >> Go to EC-202. "Diagnosis Procedure".

NO >> INSPECTION END

#### Diagnosis Procedure

#### 1.CHECK GROUND CONNECTION

- 1. Turn ignition switch OFF.
- 2. Check ground connection E21 and E38. Refer to Ground Inspection in GI-40, "Circuit Inspection".

#### is the inspection result normal?

- YES >> GO TO 2.
- NO >> Repair or replace ground connection.

#### $\mathbf{2}.$ CHECK ACCELERATOR PEDAL POSITION SENSOR 1 POWER SUPPLY CIRCUIT

- 1. Disconnect accelerator pedal position (APP) sensor harness connector.
- 2. Turn ignition switch ON.
- 3. Check the voltage between APP sensor harness connector and ground.

APP s	sensor	Ground	Voltage
Connector	Terminal	Giguna	Vollage
E110	4	Ground	Approx. 5V

Is the inspection result normal?

	YES	· >>	> GO	TO	7.
--	-----	------	------	----	----

NO >> GO TO 3.

**3.**CHECK SENSOR POWER SUPPLY CIRCUITS

Check harness for short to power and short to ground, between the following terminals.

[MR20DE]

www.digitalkhodro.com

### P1229 SENSOR POWER SUPPLY

www.digitalkhodro.com

ECMSensoConnectorTerminalItemF872Electric throttle control actuatorF878CMP sensor (PHASE)E16106APP sensors the inspection result normal?YESYES>> GO TO 4.NO>> Repair short to ground or short to power in hatI. CHECK CAMSHAFT POSITION SENSORRefer to EC-153. "Component Inspection".s the inspection result normal?YES>> GO TO 5.NO>> Replace camshaft position sensor (PHASE).D. CHECK TP SENSORRefer to EC-104. "Component Inspection".s the inspection result normal?YES>> GO TO 9.NO>> GO TO 6.D. REPLACE ELECTRIC THROTTLE CONTROL ACTUAT. Replace electric throttle control actuator.2. Go to EC-104. "Special Repair Requirement".>> INSPECTION END. CHECK APP SENSORRefer to EC-223. "Component Inspection".s the inspection result normal?s the inspection result normal?So to EC-104. "Special Repair Requirement".>> INSPECTION END. CHECK APP SENSORRefer to EC-223. "Component Inspection".s the inspection result normal?	Connector F29 F26 E110	Terminal 1 1 4 ectors.	
ConnectorTerminalItemF872Electric throttle control actuatorF878CMP sensor (PHASE)E16106APP sensors the inspection result normal?YES>> GO TO 4.NO>> Repair short to ground or short to power in hatCHECK CAMSHAFT POSITION SENSORRefer to EC-153. "Component Inspection".s the inspection result normal?YES>> GO TO 5.NO>> Replace camshaft position sensor (PHASE).D.CHECK TP SENSORRefer to EC-104. "Component Inspection".s the inspection result normal?YES>> GO TO 5.NO>> Replace camshaft position sensor (PHASE).D.CHECK TP SENSORRefer to EC-104. "Component Inspection".s the inspection result normal?YES>> GO TO 6.D.REPLACE ELECTRIC THROTTLE CONTROL ACTUAC. Replace electric throttle control actuator Go to EC-104. "Special Repair Requirement".>> INSPECTION END.CHECK APP SENSORRefer to EC-223. "Component Inspection".	Connector F29 F26 E110	1 ' 1 4	
F8       72       Electric throttle control actuator         F8       78       CMP sensor (PHASE)         E16       106       APP sensor         s the inspection result normal?       YES       >> GO TO 4.         NO       >> Repair short to ground or short to power in hard         ACHECK CAMSHAFT POSITION SENSOR         Refer to EC-153, "Component Inspection".         s the inspection result normal?         YES       >> GO TO 5.         NO       >> Replace camshaft position sensor (PHASE).         D.CHECK TP SENSOR         Refer to EC-104, "Component Inspection".         s the inspection result normal?         YES       >> GO TO 5.         NO       >> Replace camshaft position sensor (PHASE).         D.CHECK TP SENSOR         Refer to EC-104, "Component Inspection".         s the inspection result normal?         YES       >> GO TO 9.         NO       >> GO TO 6.         D.REPLACE ELECTRIC THROTTLE CONTROL ACTUAT         . Replace electric throttle control actuator.         .> INSPECTION END         .> INSPECTION END         .         .> INSPECTION END         .         .         .         .	F29 F26 E110	1 ' 1 4	
F8       78       CMP sensor (PHASE)         E16       106       APP sensor         S the inspection result normal?         YES       >> GO TO 4.         NO       >> Repair short to ground or short to power in har         .CHECK CAMSHAFT POSITION SENSOR         Refer to EC-153. "Component Inspection".         s the inspection result normal?         YES       >> GO TO 5.         NO       >> Replace camshaft position sensor (PHASE).         O.CHECK TP SENSOR         Refer to EC-104. "Component Inspection".         s the inspection result normal?         YES       >> GO TO 5.         NO       >> Replace camshaft position sensor (PHASE).         O.CHECK TP SENSOR         Refer to EC-104. "Component Inspection".         s the inspection result normal?         YES       >> GO TO 9.         NO       >> GO TO 6.         .REPLACE ELECTRIC THROTTLE CONTROL ACTUAT         . Replace electric throttle control actuator.	F26 E110	<u>' 1</u> <u>4</u>	
E16       106       APP sensor         a the inspection result normal?         YES       >> GO TO 4.         NO       >> Repair short to ground or short to power in har         .CHECK CAMSHAFT POSITION SENSOR         Refer to EC-153, "Component Inspection".         a the inspection result normal?         YES       >> GO TO 5.         NO       >> Replace camshaft position sensor (PHASE).         D.CHECK TP SENSOR         Refer to EC-104, "Component Inspection".         a the inspection result normal?         YES       >> GO TO 5.         NO       >> Replace camshaft position sensor (PHASE).         D.CHECK TP SENSOR         Refer to EC-104, "Component Inspection".         a the inspection result normal?         YES       >> GO TO 9.         NO       >> GO TO 6.         REPLACE ELECTRIC THROTTLE CONTROL ACTUA"         Replace electric throttle control actuator.	E110	4	
s the inspection result normal? YES >> GO TO 4. NO >> Repair short to ground or short to power in half .CHECK CAMSHAFT POSITION SENSOR Refer to EC-153. "Component Inspection". s the inspection result normal? YES >> GO TO 5. NO >> Replace camshaft position sensor (PHASE). D.CHECK TP SENSOR Refer to EC-104. "Component Inspection". s the inspection result normal? YES >> GO TO 9. NO >> GO TO 9. NO >> GO TO 6. D.REPLACE ELECTRIC THROTTLE CONTROL ACTUAT . Replace electric throttle control actuator. 2. Go to EC-104. "Special Repair Requirement". >> INSPECTION END 7.CHECK APP SENSOR Refer to EC-223. "Component Inspection".	rness or conne		
YES       >> GO TO 4.         NO       >> Repair short to ground or short to power in hait         .CHECK CAMSHAFT POSITION SENSOR         Refer to EC-153, "Component Inspection".         s the inspection result normal?         YES       >> GO TO 5.         NO       >> Replace camshaft position sensor (PHASE).         O.CHECK TP SENSOR         Refer to EC-104, "Component Inspection".         s the inspection result normal?         YES       >> GO TO 9.         NO       >> GO TO 6.         O.REPLACE ELECTRIC THROTTLE CONTROL ACTUATION SENSOR         Replace electric throttle control actuator.	· · · · · · · · · · · · · · · · · · ·	ectors.	
YES >> GO TO 5. NO >> Replace camshaft position sensor (PHASE). O.CHECK TP SENSOR Refer to EC-104. "Component Inspection". Sthe inspection result normal? YES >> GO TO 9. NO >> GO TO 9. NO >> GO TO 6. O.REPLACE ELECTRIC THROTTLE CONTROL ACTUAT Replace electric throttle control actuator. Go to EC-104. "Special Repair Requirement". >> INSPECTION END .CHECK APP SENSOR Refer to EC-223. "Component Inspection".	TOR	0	
Refer to EC-104. "Component Inspection". s the inspection result normal? YES >> GO TO 9. NO >> GO TO 6. D.REPLACE ELECTRIC THROTTLE CONTROL ACTUA Replace electric throttle control actuator. Co to EC-104. "Special Repair Requirement". >> INSPECTION END CHECK APP SENSOR Refer to EC-223. "Component Inspection".	TOR	0	
s the inspection result normal? YES >> GO TO 9. NO >> GO TO 6. D.REPLACE ELECTRIC THROTTLE CONTROL ACTUA Replace electric throttle control actuator. Co to EC-104. "Special Repair Requirement". >> INSPECTION END CHECK APP SENSOR Refer to EC-223. "Component Inspection".	TOR	0	
Replace electric throttle control actuator.     Go to EC-104. "Special Repair Requirement".     >> INSPECTION END     CHECK APP SENSOR Refer to EC-223. "Component Inspection".	TOR	<u> </u>	
2. Go to <u>EC-104. "Special Repair Requirement"</u> . >> INSPECTION END 7.CHECK APP SENSOR Refer to <u>EC-223, "Component Inspection"</u> .	2	0	4
Refer to EC-223, "Component Inspection".			
		-0-	
YES >> GO TO 9. NO >> GO TO 8.			
<b>B</b> .REPLACE ACCELERATOR PEDAL ASSEMBLY			
<ol> <li>Replace accelerator pedal assembly.</li> <li>Go to <u>EC-14</u>. "ACCELERATOR PEDAL RELEASED ment".</li> </ol>	POSITION L	EARNING : Spe	ecial Repair Require
>> INSPECTION END			
<b>9.</b> CHECK INTERMITTENT INCIDENT			_
Refer to GI-38, "Intermittent Incident".			
>> INSPECTION END			

### P1564 ASCD STEERING SWITCH

#### < COMPONENT DIAGNOSIS >

P1564 ASCD STEERING SWITCH

### Description

ASCD steering switch has variant values of electrical resistance for each button. ECM reads voltage variation of switch, and determines which button is operated.

Refer to <u>EC-44. "System Description"</u> for the ASCD function.

#### DTC Logic

#### DTC DETECTION LOGIC

#### NOTE:

If DTC P1564 is displayed with DTC P0605, first perform the trouble diagnosis for DTC P0605. Refer to <u>EC-162, "DTC Logic"</u>.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1564	ASCD steering switch	<ul> <li>An excessively high voltage signal from the ASCD steering switch is sent to ECM.</li> <li>ECM detects that input signal from the ASCD steering switch is out of the specified range.</li> <li>ECM detects that the ASCD steering switch is stuck ON.</li> </ul>	<ul> <li>Harness or connectors (The switch circuit is open or shorted.)</li> <li>ASCD steering switch</li> <li>ECM</li> </ul>

#### DTC CONFIRMATION PROCEDURE

#### 1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

#### >> GO TO 2.

### 2.PERFORM DTC CONFIRMATION PROCEDURE

- 1. Turn ignition switch ON.
- 2. Wait at least 10 seconds.
- 3. Press MAIN switch for at least 10 seconds, then release it and wait at least 10 seconds.
- 4. Press CANCEL switch for at least 10 seconds, then release it and wait at least 10 seconds.
- 5. Press RESUME/ACCELERATE switch for at least 10 seconds, then release it and wait at least 10 seconds.
- 6. Press SET/COAST switch for at least 10 seconds, then release it and wait at least 10 seconds.
- 7. Check DTC.

#### Is DTC detected?

- YES >> Go to EC-204, "Diagnosis Procedure".
- NO >> INSPECTION END

#### Diagnosis Procedure

### 1.CHECK GROUND CONNECTION

- 1. Turn ignition switch OFF.
- 2. Check ground connection E21 and E38. Refer to Ground Inspection in GI-40, "Circuit Inspection".

#### Is the inspection result normal?

- YS >> GO TO 2.
- NO >> Repair or replace ground connection.

### **2.**CHECK ASCD STEERING SWITCH CIRCUIT

#### 1. Turn ignition switch ON.

2. Check the voltage between ECM harness connector terminals.

INFOID:000000004899

### [MR20DE]

www.digitalkhodro.com

INFOID:000000004899987

INFOID-00000000489898

### P1564 ASCD STEERING SWITCH

< COMPONENT DIAGNOSIS >

www.digitalkhodro.com

[MR20DE]

		+ Terminal	- Termi	nal	Condition	Voltage	•
E16		Terminal	Term	nal			
				MAIN switch	n: Pressed	Approx. 0V	
		04	-	L	vitch: Pressed	Approx. 1V	
	(ASCD stee	94 ering switch si	gnal) 95	SET/COAS	T switch: Pressed	Approx. 2V	
the inspec	1	Ŭ		RESUME/A	CCELERATE switch: Pressed	Approx. 3V	
the inspec				All ASCD st	eering switches: Released	Approx. 4V	
YES >> NO >> CHECK Turn igr Disconr Disconr	GO TO 8 GO TO 3 ASCD ST nition swi nect ECM nect com	3. FEERING S tch OFF. 1 hamess c bination sw	onnector. itch harnes	ss connector N	UIT FOR OPEN AND SH 1352. Ind ECM harness connect		
<u></u>			· · ·				
Combination		EC		Continuity		·	
Termir	nal	Connector	Terminal	_			
15		E16	95	Existed d and short to			
heck the for Harness of Combinati Harness for >> .CHECK	ollowing. connector ion switch or open a Repair o ASCD S <sup>-</sup>	pen circuit	05 ble) etween EC or short to SWITCH IN	IPUT SIGNAL	ort to power in harness or CIRCUIT FOR OPEN AI	ND SHORT	
. Check t	ine contir	nuity betwe	en ECM na	arness connec	tor and combination swite	cn.	
combinatio	n switch	EC	CM	Continuity			
Termi	nal	Connector	Terminal	Continuity			
14		E16	94	Existed			
. Also ch	eck harn	ess for sho	rt to groun	d and short to	power.		
	ction res	<u>uit normal?</u>		· .			
<u>s the inspe</u>	GO TO						
YES >>		C					
YES >> NO >>	GOTO	D. NCTIONIN					

Combination switch (spiral cable)
Harness for open and short between ECM and combination switch

>> Repair open circuit or short to ground or short to power in harness or connectors.

EC-205

### P1564 ASCD STEERING SWITCH

< COMPONENT DIAGNOSIS >

### 7. CHECK ASCD STEERING SWITCH

Refer to EC-206, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 8.

NO >> Replace ASCD steering switch.

8. CHECK INTERMITTENT INCIDENT

Refer to GI-38, "Intermittent Incident".

#### >> INSPECTION END

#### Component Inspection

### 1. CHECK ASCD STEERING SWITCH

- 1. Disconnect combination switch (spiral cable) harness connector.
- 2. Check the continuity between combination switch harness connector terminals under following conditions.

Combinati	ion switch	: Condition	Desistance
Connector	Terminals	Condition	Resistance
·		MAIN switch: Pressed	Approx. 0 Ω
	14 and 15	CANCEL switch: Pressed	Approx. 250 Ω
M352		SET/COAST switch: Pressed	Approx. 660 Ω
		RESUME/ACCELERATE switch: Pressed	Approx. 1,480 Ω
		All ASCD steering switches: Released	Approx. 4,000 Ω

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace ASCD steering switch

www.digitalkhodro.com

[MR20DE]

INFO/D:00000000489998

< COMPONENT DIAGNOSIS >

### P1572 ASCD BRAKE SWITCH

#### Description

When the brake pedal is depressed, ASCD brake switch is turned OFF and stop lamp switch is turned ON. ECM detects the state of the brake pedal by this input of two kinds (ON/OFF signal). Refer to EC-44, "System Description" for the ASCD function.

#### DTC Logic

INFOID:00000004899991 С

A

EC

D

٣

Κ

L

М

N

0

Р

#### DTC DETECTION LOGIC NOTE:

- If DTC P1572 is displayed with DTC P0605, first perform the trouble diagnosis for DTC P0605. Refer to EC-162, "DTC Logic".
- · This self-diagnosis has the one trip detection logic. When malfunction A is detected, DTC is not Ε stored in ECM memory. And in that case, 1st trip DTC is displayed. 1st trip DTC is erased when ignition switch OFF. And even when malfunction A is detected in two consecutive trips, DTC is not stored in ECM memory.

DTC No.	Trouble diagnosis name		DTC detecting condition		Possible cause	
		A)	When the vehicle speed is above 30 km/h (19 MPH), ON signals from the stop lamp switch and the ASCD brake switch are sent to the ECM at the same time.	•	Harness or connectors (The stop lamp switch circuit is shorted.) Harness or connectors (The ASCD brake switch circuit is shorted.)	G H
P1572	ASCD brake switch	B)	ASCD brake switch signal is not sent to ECM for extremely long time while the ve-	•	Harness or connectors (The ASCD clutch switch circuit is shorted.) Stop lamp switch ASCD brake switch ASCD clutch switch incorrect stop lamp switch installation	
	کاران خمدر		hicle is driving.		Incorrect ASCD brake switch installation Incorrect ASCD clutch switch installation ECM	J

#### DTC CONFIRMATION PROCEDURE

#### 1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

#### NOTE:

Procedure for malfunction B is not described here. It takes extremely long time to complete procedure for malfunction B. By performing procedure for malfunction A, the incident that causes malfunction B can be detected.

#### >> GO TO 2.

#### ${f 2}.$ PERFORM DTC CONFIRMATION PROCEDURE FOR MALFUNCTION A

- 1. Start engine.
- Press MAIN switch and make sure that CRUISE indicator is displayed in combination meter. 2.
- Drive the vehicle for at least 5 consecutive seconds under the following conditions. 3.
  - CAUTION: Always drive vehicle at a safe speed.

NOTE:

This procedure may be conducted with the drive wheels lifted in the shop or by driving the vehicle. If a road test is expected to be easier, it is unnecessary to lift the vehicle.

Vehicle speed	More than 30 km/h (19 mph)
Selector lever	Suitable position

Check DTC. 4



[MR20DE]

INFO(D:000000004899996

www.digitalkhodro.com

www.digitalkhodro.com

[MR20DE]

NFOID:000000004899992

< COMPONENT DIAGNOSIS >

Is DTC detected?

YES >> Go to EC-208, "Diagnosis Procedure".

NO >> GO TO 3.

**3.**PERFORM DTC CONFIRMATION PROCEDURE FOR MALFUNCTION B

1. Drive the vehicle for at least 5 consecutive seconds under the following conditions.

CAUTION: Always drive vehicle at a safe speed.

NOTE:

This procedure may be conducted with the drive wheels lifted in the shop or by driving the vehicle. If a road test is expected to be easier, it is unnecessary to lift the vehicle.

Vehicle speed	More than 30 km/h (19 mph)
Selector lever	Suitable position
Driving location	Depress the brake pedal for more than five seconds so as not to come off from the above-mentioned vehicle speed.

#### 2. Check DTC.

Is DTC detected?

NO >> INSPECTION END

Diagnosis Procedure

#### 1.CHECK OVERALL FUNCTION-I

- 1. Turn ignition switch ON.
- 2. Check the voltage between ECM harness connector terminals.

	ECM				
Connector	· · · · · · · · · · · · · · · · · · ·	5. DF.,	Condition	Voltage	
Connector	Terminal	Terminal	اوس سامات دید		
E16	100	108	Brake pedal (CVT)	Slightly depressed	Approx. 0V
	(ASCD brake switch signal)	100	Brake pedal and clutch pedal (M/T)	Fully released	Battery voltage

#### Is the inspection result normal?

YES >> GO TO 2.

NO >> GO TO 3.

### 2. CHECK OVERALL FUNCTION-II

Check the voltage between ECM harness connector terminals.

	ECM				
Connector + Terminal		-	Condition		Voltage
		Terminal			
E16	99	108	Brake pedal	Slightly depressed	Battery voltage
	(Stop lamp switch signal)	100	Diake pedal	Fully released	Approx. 0V

#### Is the inspection result normal?

YES >> GO TO 16.

NO >> GO TO 11.

### **3.**CHECK ASCD BRAKE SWITCH POWER SUPPLY CIRCUIT-I

1. Turn ignition switch OFF.

2. Disconnect ASCD brake switch harness connector.

3. Turn ignition switch ON:

### 021-62999292

### 021-62999292

YES >> Go to EC-208, "Diagnosis Procedure".

www.digitalkhodro.com

< COMPONENT					• • • • •		[M	R20DE]
Check the vo	ltage betwee	n ASCD bra	ike switch l	harness coi	nnector ar	nd ground.	•	
			·					*
ASCD brake swi	Ground	Voltage	·			5		
E112 1		Battery volta	08			-		
s the inspection				•			-,	
YES >> GO <sup>-</sup>		<u>.</u>						
NO-1 >> CVT	models: GO					4		
4	models: GO T				<b>-</b>	,		
1.DETECT MAL							·	
Check the followi Harness conne		177				•		
10 A fuse (No.4)	4)						•	
• Harness for op	en or short be	tween ASC	D brake sv	vitch and fu	se			
. Da-	air anan airawi	t or chort to	around or	short to po	war in har	ness or conne	octore	
	•		•	•				
•								*
Turn ignition     Disconnect	Switch OFF.	witch harne	ss connec	tor.				
3. Turn ignition	switch ON.					• • • •		
. Check the vo	oltage betwee	n ASCD clu	tch switch	harness co	nnector ar	nd ground.		
ASCD clutch sw	itch					1	Q ·	
	ninal Ground	Voltage						
E111	I Ground	Battery volta	ae		< 1			
s the inspection			یتان حق		اسرد			·
YES >> GO						0		
NO >> GO				بن ساما				
DETECT MAL	FUNCTIONI	NG PART						
Check the follow		177						
<ul> <li>Hamess conne</li> <li>10 A fuse (No.4</li> </ul>							•	
Harness for op		tween ASC	D clutch sv	witch and fu	IS <del>C</del>			
_				• • • •			· ·	
-	•		-			ness or conne	ectors.	
CHECK ASCI	D BRAKE SW	ITCH POW	ER SUPPL	Y CIRCUIT	-!!	•		<u> </u>
<ol> <li>Turn ignition</li> <li>Disconnect A</li> </ol>	switch OFF. ASCD brake s	witch harne	ss connec	for				
					s connect	or and ASCD	brake switch	harness
connector.								
4000			<u></u>					
ASCD clutch swit	<u> </u>	rake switch	Continuity					
Connector Termi								
E111 2		1 ort to group	Existed	t to power				
<ol> <li>Also check h Is the inspection</li> </ol>		-	u anu shor	t to power.				
YES >> GO		Ŀ						
		t or short to	ground or	short to po	wer in har	ness or conne	ectors.	
8.CHECK ASCI	D CLUTCH S	NITCH						,

.

۰.

1

c,

7

.

•

www.digitalkhodro.com

< COMPONENT DIAGNOSIS >

[MR20DE]

Refer to EC-211, "Component Inspection (ASCD Clutch Switch)".

Is the inspection result normal?

YES >> GO TO 16.

NO >> Replace ASCD clutch switch.

9. CHECK ASCD BRAKE SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.

2. Disconnect ECM harness connector.

3. Check the continuity between ASCD brake switch harness connector and ECM harness connector.

ASCD brake switch		E	Continuity	
Connector	Terminal	Connector	Terminal	Contaidity
E112	2	, E16	100	Existed

4. Also check harness for short to ground and short to power.

#### Is the inspection result normal?

YES >> GO TO 10.

NO >> Repair open circuit or short to ground or short to power in harness or connectors.

**10.**CHECK ASCD BRAKE SWITCH

Refer to EC-211, "Component Inspection (ASCD Brake Switch)".

Is the inspection result normal?

YES >> GO TO 16.

NO >> Replace ASCD brake switch.

11. CHECK STOP LAMP SWITCH POWER SUPPLY CIRCUIT

Turn ignition switch OFF.

2. Disconnect stop lamp switch harness connector.

3. Check the voltage between stop lamp switch harness connector and ground.

Stop lamp	o switch	Ground	اسام أمهما حينا	
Connector	Terminal	Ground	Voltage	
E114 (M/T) E115 (CVT)	1	Ground	Battery voltage	•

Is the inspection result normal?

Y	ES	>>	GO	TO	13.
ι.	LO	11	QQ.		10

NO >> GO TO 12.

12. DETECT MALFUNCTIONING PART

Check the following.

Harness connectors E105, M77

10A fuse (No.11)

Harness for open or short between stop lamp switch and battery

>> Repair open circuit or short to ground or short to power in harness or connectors.

13. CHECK STOP LAMP SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.

2. Check the continuity between ECM harness connector and stop lamp switch harness connector.

EC	M	Stop lamp	Continuity	
Connector	Terminal	Connector	Terminal	Continuity
E16	99	E114 (M/T) E115 (CVT)	2	Existed

3. Also check harness for short to ground and short to power.

			572 ASCD BRAKE		
	NENT DIAG			*	[MR20DE]
	ction result r				
	GO TO 15.	<u>iomar.</u>		• • • •	•
	GO TO 14.			: •	
14.DETE	CT MALFUN	ICTIONING PA	RT	•	
Check the f		<u> </u>		-	
		hort between E	CM and stop lamp swite	ch	
· -			t to ground or short to p	ower in harness or cor	nectors.
<b>15.</b> снес	K STOP LA	MP SWITCH		· · · · · · · · · · · · · · · · · · ·	
Refer to EC	-212, "Com	ponent Inspecti	on (Stop Lamp Switch)"	.• ×	
s the inspe	ction result r	normal?			•
	GO TO 16.			<b>、</b>	•
	•	op lamp switch.			
IO.CHEC		FTENT INCIDE	NT	· · · · · · · · · · · · · · · · · · ·	
Refer to <u>GI</u>	-38, "Intermit	ttent Incident".			
		· · · · · · · · -		· · · · · ·	
	INSPECTIO			,	
Compone	ent Inspec	ction (ASCD	Brake Switch)	1	P INFOID;000000048999
•		•	Brane enneny		
			••		
1.снеск	ASCD BRAI	KE SWITCH-I			0
1.CHECK	ASCD BRAI	KE SWITCH-I OFF. orake switch ha	arness connector. CD brake switch termina	t Is under the following o	conditions.
1.CHECK 1. Turn ig 2. Discon 3. Check	ASCD BRAI nition switch nect ASCD t the continuit	KE SWITCH-I OFF. orake switch ha y between ASC	rness connector. CD brake switch termina	Is under the following o	conditions.
1.CHECK	ASCD BRAI nition switch nect ASCD t the continuit	KE SWITCH-I OFF. orake switch ha y between ASC	arness connector. CD brake switch termina	Is under the following o	conditions.
1.CHECK 1. Turn ig 2. Discon 3. Check	ASCD BRAI nition switch nect ASCD t the continuit	KE SWITCH-I OFF. Drake switch ha y between ASC ondition Fully released	rness connector. CD brake switch termina Continuity Existed	t Is under the following o	conditions.
1. CHECK 1. Turn ig 2. Discon 3. Check Terminals 1 and 2	ASCD BRAI nition switch nect ASCD t the continuit C Brake pedal	KE SWITCH-I OFF. Drake switch ha y between ASC ondition Fully released Slightly depressed	rness connector. CD brake switch termina Continuity Existed	* Is under the following o	conditions.
1.CHECK 1. Turn ig 2. Discon 3. Check Terminals 1 and 2 Is the inspe	ASCD BRAI nition switch nect ASCD t the continuit Brake pedal ection result	KE SWITCH-I OFF. Drake switch ha y between ASC ondition Fully released Slightly depressed normal?	rness connector. CD brake switch termina Continuity Existed	t Is under the following o	conditions.
1.CHECK 1. Turn ig 2. Discon 3. Check Terminals 1 and 2 1 and 2 1s the inspective YES >>	ASCD BRAI nition switch nect ASCD t the continuit C Brake pedal	KE SWITCH-I OFF. Drake switch ha y between ASC ondition Fully released Slightly depressed normal?	rness connector. CD brake switch termina Continuity Existed	* Is under the following o	conditions.
1.CHECK 1. Turn ig 2. Discon 3. Check Terminals 1 and 2 1 and 2 Is the inspective YES >> NO >>	ASCD BRAI nition switch nect ASCD to the continuit Brake pedal ection result in NSPECTIC GO TO 2.	KE SWITCH-I OFF. Drake switch ha y between ASC ondition Fully released Slightly depressed normal? DN END	rness connector. CD brake switch termina Continuity Existed	t Is under the following o	conditions.
1.CHECK 1. Turn ig 2. Discon 3. Check Terminals 1 and 2 1 and 2 1 s the inspective YES >> NO >> 2.CHECK	ASCD BRAN nition switch nect ASCD to the continuit Brake pedal ection result to INSPECTIO GO TO 2. ASCD BRAN	KE SWITCH-I OFF. Orake switch ha y between ASC ondition Fully released Slightly depressed normal? ON END KE SWITCH-II	Trness connector. CD brake switch termina Continuity Existed d Not existed	شرکن ولير	
1. CHECK 1. Turn ig 2. Discon 3. Check 1 and 2 1 and 2 1 s the inspective YES >> NO >> 2. CHECK 1. Adjust "Inspective"	ASCD BRAI nition switch nect ASCD to the continuit Brake pedal Extion result in NSPECTIC GO TO 2. ASCD BRAI ASCD brake	KE SWITCH-I OFF. orake switch ha y between ASC ondition Fully released Slightly depressed normal? DN END KE SWITCH-II ke switch insta justment"(RHD	Continuity Existed d Not existed	شرک اولیر "Inspection and Adj	<u>ustment"</u> (LHD), <u>BR-52</u>
1. CHECK 1. Turn ig 2. Discon 3. Check 1 and 2 1 and 2 1 s the inspective YES >> NO >> 2. CHECK 1. Adjust "Inspective"	ASCD BRAI nition switch nect ASCD to the continuit Brake pedal Extion result in NSPECTIC GO TO 2. ASCD BRAI ASCD brake	KE SWITCH-I OFF. orake switch ha y between ASC ondition Fully released Slightly depressed normal? DN END KE SWITCH-II ke switch insta justment"(RHD	Continuity Existed d Not existed	شرک اولیر "Inspection and Adj	<u>ustment"</u> (LHD), <u>BR-52</u>
1. CHECK 1. Turn ig 2. Discon 3. Check 1 and 2 1 and 2 1 and 2 1 s the inspective YES >= NO >= 2. CHECK 1. Adjust "Inspective" 2. Check	ASCD BRAI nition switch nect ASCD to the continuit Brake pedal Brake pedal CO Brake pedal INSPECTIC GO TO 2. ASCD BRAI ASCD brake ction and Ad the continuit	KE SWITCH-I OFF. Drake switch ha y between ASC ondition Fully released Slightly depressed normal? DN END KE SWITCH-II te switch insta justment"(RHD y between ASC	Continuity Existed d Not existed	شرک اولیر "Inspection and Adj	<u>ustment"</u> (LHD), <u>BR-52</u>
1. CHECK 1. Turn ig 2. Discon 3. Check 1 and 2 1 and 2 1 s the inspective YES >> NO >> 2. CHECK 1. Adjust "Inspective"	ASCD BRAI nition switch nect ASCD to the continuit Brake pedal Brake pedal CO Brake pedal INSPECTIC GO TO 2. ASCD BRAI ASCD brake ction and Ad the continuit	KE SWITCH-I OFF. Drake switch ha y between ASC ondition Fully released Slightly depressed NEND KE SWITCH-II ke switch insta <u>ustment"</u> (RHD y between ASC	Arness connector. CD brake switch termina Continuity Existed d Not existed Allation. Refer to <u>BR-8</u> ). CD brake switch termina	شرک اولیر "Inspection and Adj	<u>ustment"</u> (LHD), <u>BR-52</u>
1. CHECK 1. Turn ig 2. Discon 3. Check 1 and 2 1 and 2 1 and 2 1 s the inspective YES >= NO >= 2. CHECK 1. Adjust "Inspective" 2. Check	ASCD BRAI nition switch nect ASCD to the continuit Brake pedal Brake pedal CO Brake pedal INSPECTIC GO TO 2. ASCD BRAI ASCD brake ction and Ad the continuit	KE SWITCH-I OFF. orake switch ha y between ASC ondition Fully released Slightly depressed normal? ON END KE SWITCH-II te switch insta justment"(RHD y between ASC ondition Fully released	Continuity Existed d Not existed	شرک اولیر "Inspection and Adj	<u>ustment"</u> (LHD), <u>BR-52</u>
1. CHECK         1. Turn ig         2. Discon         3. Check         Terminals         1 and 2         Is the inspective         YES         NO         2. CHECK         1. Adjust         "Inspect         2. CHECK         1. Adjust         "Inspect         2. Check         Terminals         1 and 2	ASCD BRAN nition switch nect ASCD to the continuit Brake pedal NSPECTIC GO TO 2. ASCD BRAN ASCD brak ction and Ad the continuit C Brake pedal	KE SWITCH-I OFF. orake switch ha y between ASC ondition Fully released Slightly depressed NEND KE SWITCH-II te switch insta <u>justment"</u> (RHD y between ASC ondition Fully released Slightly depressed	Continuity Existed d Not existed	شرک اولیر "Inspection and Adj	<u>ustment"</u> (LHD), <u>BR-52</u>
1. CHECK         1. Turn ig         2. Discon         3. Check         Terminals         1 and 2         Is the inspective of the second se	ASCD BRAN nition switch nect ASCD to the continuit Brake pedal ection result to INSPECTIC GO TO 2. ASCD BRAN ASCD brake the continuit C Brake pedal ction and Ad the continuit	KE SWITCH-I OFF. orake switch ha y between ASC ondition Fully released Slightly depressed normal? ON END KE SWITCH-II te switch insta justment"(RHD) y between ASC ondition Fully released Slightly depressed normal?	Continuity Existed d Not existed	شرک اولیر "Inspection and Adj	<u>ustment"</u> (LHD), <u>BR-52</u>
1. CHECK         1. Turn ig         2. Discon         3. Check         Terminals         1 and 2         Is the inspective         YES         NO         2. CHECK         1. Adjust         "Inspection"         2. CHECK         Terminals         1 and 2         Is the inspective         1 and 2         YES         Sthe inspective         YES	ASCD BRAI nition switch nect ASCD to the continuit Brake pedal ection result of ASCD BRAI ASCD BRAI ASCD brake the continuit C Brake pedal ction and Ad the continuit C Brake pedal	KE SWITCH-I OFF. orake switch ha y between ASC ondition Fully released Slightly depressed normal? ON END KE SWITCH-II te switch insta justment"(RHD) y between ASC ondition Fully released Slightly depressed normal?	Arness connector. CD brake switch termina Continuity Existed d Not existed Allation. Refer to <u>BR-8</u> D brake switch termina Continuity Existed d Not existed	شرک اولیر "Inspection and Adj	<u>ustment"</u> (LHD), <u>BR-52</u>
1. CHECK         1. Turn ig         2. Discon         3. Check         Terminals         1 and 2         Is the inspective         YES         NO         2. CHECK         1. Adjust         "Inspection"         2. CHECK         NO         YES         NO	ASCD BRAN nition switch nect ASCD I the continuit Brake pedal ection result ( ASCD BRAN ASCD BRAN ASCD BRAN ASCD brake the continuit C Brake pedal ction and Ad the continuit C Brake pedal Externa and Ad the continuit	KE SWITCH-I OFF. orake switch ha y between ASC ondition Fully released Slightly depressed DN END KE SWITCH-II te switch insta <u>ustment"(RHD</u> y between ASC ondition Fully released Slightly depressed Slightly depressed DN END SCD brake swit	Arness connector. CD brake switch terminal Continuity Existed d Not existed Allation. Refer to <u>BR-8</u> D brake switch terminal Continuity Existed d Not existed continuity Existed d Not existed	شرک اولیر "Inspection and Adj	t ustment" (LHD), <u>BR-52</u> conditions.
1. CHECK         1. Turn ig         2. Discon         3. Check         Terminals         1 and 2         Is the inspective         YES         NO         2. CHECK         1. Adjust         "Inspection"         2. CHECK         NO         YES         NO	ASCD BRAN nition switch nect ASCD I the continuit Brake pedal ection result ( ASCD BRAN ASCD BRAN ASCD BRAN ASCD brake the continuit C Brake pedal ction and Ad the continuit C Brake pedal Externa and Ad the continuit	KE SWITCH-I OFF. orake switch ha y between ASC ondition Fully released Slightly depressed DN END KE SWITCH-II te switch insta <u>ustment"(RHD</u> y between ASC ondition Fully released Slightly depressed Slightly depressed DN END SCD brake swit	Arness connector. CD brake switch termina Continuity Existed d Not existed Allation. Refer to <u>BR-8</u> D brake switch termina Continuity Existed d Not existed	شرک اولیر "Inspection and Adj	<u>ustment"</u> (LHD), <u>BR-52</u>

Turn ignition switch OFF.
 Disconnect ASCD clutch switch harness connector.
 Check the continuity between ASCD clutch switch terminals under the following conditions.

#### < COMPONENT DIAGNOSIS >

Terminals	Condition		Continuity	
1 and 2	Clutch pedal	Fully released	Existed	
		Slightly depressed	Not existed	

#### Is the inspection result normal?

YES >> INSPECTION END NO >> GO TO 2.

2. CHECK ASCD CLUTCH SWITCH-II

1. Adjust ASCD clutch switch installation.

2. Check the continuity between ASCD clutch switch terminals under the following conditions.

Terminals	Condition		Continuity
1 and 2	Clutch pedal	Fully released	Existed
	Claten pedal	Slightly depressed	Not existed

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace ASCD clutch switch.

#### Component Inspection (Stop Lamp Switch)

#### 1.CHECK STOP LAMP SWITCH-I

1. Turn ignition switch OFF.

2. Disconnect stop lamp switch harness connector.

3. Check the continuity between stop lamp switch terminals under the following conditions.

Terminals	Condition		Continuity	
1 and 2	Brake pedal	Fully released	Not existed	
	Diake pedal	Slightly depressed	Existed	

Is the inspection result normal?

YES >> INSPECTION END

NO >> GO TO 2.

2.CHECK STOP LAMP SWITCH-II

- Adjust stop lamp switch installation. Refer to <u>BR-8</u>, "Inspection and Adjustment" (LHD), <u>BR-52</u>, "Inspection and Adjustment" (RHD).
- 2. Check the continuity between stop lamp switch terminals under the following conditions.

Terminals	С	Continuity	
1 and 2	Brake pedal	Fully released	Not existed
	Diano pedal	Slightly depressed	Existed

Is the inspection result normal?

YES. >> INSPECTION END

NO >> Replace stop lamp switch.

#### 021-62999292

[MR20DE]

INFOID:00000000489999

### P1574 ASCD VEHICLE SPEED SENSOR

#### < COMPONENT DIAGNOSIS >

### [MR20DE]

www.digitalkhodro.com

INFOID:000000004899

INFOID-000000004899992

# P1574 ASCD VEHICLE SPEED SENSOR

#### Description

The ECM receives two vehicle speed sensor signals via CAN communication line. One is sent from combination meter, and the other is from TCM (Transmission control module). The ECM uses these signals for ASCD control. Refer to EC-44. "System Description" for ASCD functions.

#### DTC Logic

DTC DETECTION LOGIC

#### NOTE:

- D If DTC P1574 is displayed with DTC U1000 or U1001, first perform the trouble diagnosis for DTC U1000, U1001. Refer to EC-87. "DTC Logic".
- If DTC P1574 is displayed with DTC U1010, first perform the trouble diagnosis for DTC U1010. Refer Е to EC-88. "DTC Logic".
- If DTC P1574 is displayed with DTC P0500, first perform the trouble diagnosis for DTC P0500. Refer to EC-161, "DTC Logic"
- If DTC P1574 is displayed with DTC P0605, first perform the trouble diagnosis for DTC P0605. Refer F to EC-162. "DTC Logic"

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause	G
P1574	ASCD vehicle speed sensor	ECM detects a difference between two vehicle speed signals is out of the specified range.	<ul> <li>Harness or connectors (The CAN communication line is open or shorted.)</li> <li>ABS actuator and electric unit (control unit)</li> <li>TCM</li> <li>ECM</li> </ul>	H

#### DTC CONFIRMATION PROCEDURE

#### 1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

>> GO TO 2.

#### 2 PERFORM DTC CONFIRMATION PROCEDURE

1. Start engine.	L
2. Drive the vehicle at more than 40 km/h (25 MPH).	
CAUTION:	
Always drive vehicle at a safe speed.	N
NOTE:	
This procedure may be conducted with the drive wheels lifted in the shop or by driving the vehicle.	
If a road test is expected to be easier, it is unnecessary to lift the vehicle.	N
3. Check DTC.	
Is DTC detected?	
YES >> Go to EC-213, "Diagnosis Procedure".	0
NO >> INSPECTION END	
Diagnosis Procedure	
	р
1.снеск отс with тсм	•
Check DTC with TCM. Refer to TM-36. "Diagnosis Description".	
Is DTC detected?	
NO >> GO TO 2.	
YES >> Perform trouble shooting relevant to DTC indicated.	

А

EC

C

K

### P1574 ASCD VEHICLE SPEED SENSOR

< COMPONENT DIAGNOSIS >

www.digitalkhodro.com

[MR20DE]

**2.**CHECK DTC WITH "ABS ACTUATOR AND ELECTRIC UNIT (CONTROL UNIT)"

Refer to BRC-49, "Diagnostic Work Sheet".

Is DTC detected?

NO >> INSPECTION END

YES >> Perform trouble shooting relevant to DTC indicated.

حيجيتال خودرو



اولین سامانه دیجیتال تعمیرکاران خودرو در ایران

• • • • • •

: :

. . .

.

.

021-62999292

### P1706 PNP SWITCH

### www.digitalkhodro.com

· [MR20DE]
------------

INFOID:000000004899999

INFOID:000000004900000

### < COMPONENT DIAGNOSIS >

### P1706 PNP SWITCH

#### Description

When the shift lever position is P or N (CVT), Neutral position (M/T), park/neutral position (PNP) switch is ON. ECM detects the position because the continuity of the line (the ON signal) exists.

DTC Logic

#### DTC DETECTION LOGIC

DTC No. Trouble diagnosis name		DTC detecting condition	Possible cause	
P1706	Park/neutral position switch	The signal of the park/neutral position (PNP) switch is not changed in the process of engine starting and driving.	<ul> <li>Harness or connectors (PNP switch circuit is open or shorted.)</li> <li>PNP switch</li> </ul>	E
Compon	ent Function Che	ck	INFO/D.000000004900001	

### **1.**PERFORM COMPONENT FUNCTION CHECK

- 1. Turn ignition switch ON.
- 2. Check the voltage between ECM harness connector and ground.

ECM					•		
+		-	- Conditio		ondition	Voltage	
Connector	Terminal	Connector	Terminal				
F8	69 (PNP switch signal)	E16	108	Shift lever	P or N (CVT) Neutral (M/T)	Battery voltage	
(PNP SV	(FINE SWITCH SIGNAL)	ر و سام	ں حود	يجيبار	Except above	Approx. 0V	
is the insp	ection result norm	al?	· · · ·				
	> INSPECTION E		بحيتار	بامانه د			•
NO >:	> Go to EC-215, "	Diagnosis	Procedu	<u>re"</u> .			
Diagnos	is Procedure						INFOID:000000004900002
1							
	PNP SWITCH P		JPPLY CI	RCUIT			
1. Turn iç	gnition switch OF	=					· · · ·
1. Turn ig 2. Discor	gnition switch OFF	position (			ss connector.		. <u></u>
1. Turn iç 2. Discor 3. Turn iç	gnition switch OFF nnect park/neutral gnition switch ON	= position (	PNP) swi	tch harnes		und.	· · · · ·
1. Turn iç 2. Discor 3. Turn iç	gnition switch OFF	= position (	PNP) swi	tch harnes		und.	. <u></u> .
1. Turn iç 2. Discor 3. Turn iç 4. Check	gnition switch OFF nnect park/neutral gnition switch ON	een PNP s	PNP) swit	tch harnes		und.	
1. Turn iç 2. Discor 3. Turn iç 4. Check	gnition switch OFf nnect park/neutral gnition switch ON the voltage betw	= position (	PNP) swi	tch harnes		und.	
1. Turn ig 2. Discor 3. Turn ig 4. Check	gnition switch OFF nect park/neutral gnition switch ON the voltage betw PNP switch ctor Terminal	een PNP s	PNP) swit	tch harnes		und.	. <u> </u>
1. Turn ig 2. Discor 3. Turn ig 4. Check F Conne	gnition switch OFf nect park/neutral gnition switch ON the voltage betw PNP switch ctor Terminal VT) 7	een PNP s	PNP) swit	ness conr		und.	· · · · · · · · · · · · · · · · · · ·
1. Turn ig 2. Discor 3. Turn ig 4. Check F Conner F21 (C	gnition switch OFF nect park/neutral gnition switch ON the voltage betw PNP switch ctor Terminal VT) 7 (2WD)] 2	een PNP s	PNP) swit switch har Voltage	ness conr		und.	
1. Turn ig 2. Discor 3. Turn ig 4. Check F Conner F21 (C F46 [M/T (	gnition switch OFf nnect park/neutral gnition switch ON the voltage betw PNP switch ctor Terminal VT) 7 (2WD)] 2 (4WD)] 2	Fosition ( een PNP s Ground Ground	PNP) swit switch har Voltage	ness conr		und.	
1. Turn ig 2. Discor 3. Turn ig 4. Check F Conne F21 (C F46 [M/T i F48 [M/T i Is the insp	gnition switch OFF nect park/neutral gnition switch ON the voltage betw PNP switch ctor Terminal VT) 7 (2WD)] 2	Fosition ( een PNP s Ground Ground	PNP) swit switch har Voltage	ness conr		und.	

#### C.DTECTED MALFUNCTIONING PART

#### Check the following.

- Harness connectors E6, F123
- Harness for open or short between PNP switch and IPDM E/R

А

EC

С

F

G

### P1706 PNP SWITCH

#### < COMPONENT DIAGNOSIS >

[MR20DE]

>> Repair open circuit or short to ground or short to power in harness or connectors.

### $\mathbf{3}$ . Check PNP switch input signal circuit for open and short

1. Turn ignition switch OFF.

2. Disconnect ECM harness connector.

3. Check the continuity between PNP switch harness connector and ECM harness connector.

PNP swite	EC	Continuity		
Connector	Terminal	Connector	Terminal	Continuity
F21 (CVT)	6			
F46 [M/T (2WD)]	3	F8	<b>69</b>	Existed
F48 [M/T (4WD)]	1			

4. Also check harness for short to ground and short to power.

#### Is the inspection result normal?

YES >> GO TO 4.

NO >> Repair open circuit or short to ground or short to power in harness or connectors.

4.CHECK PNP SWITCH

Refer to TM-4, "Work Flow".

Is the inspection result normal?

YES >> GO TO 5.

NO >> Replace PNP switch.

**D.**CHECK INTERMITTENT INCIDENT

Refer to GI-38, "Intermittent Incident".

>> INSPECTION END

### اولين سامانه ديجيتال تعميركاران خودرو در ايران

021-62999292

#### 021-62999292
#### IMR20DE1 < COMPONENT DIAGNOSIS > P1715 INPUT SPEED SENSOR (PRIMARY SPEED SENSOR) А Description INFOID-000000004900003 ECM receives primary speed sensor signal from TCM through CAN communication line. ECM uses this signal ЕC for engine control. DTC Logic INFQID;00000000490000-С DTC DETECTION LOGIC NOTE: • If DTC P1715 is displayed with DTC U1000 or U1001 first perform the trouble diagnosis for DTC D U1000, U1001. Refer to EC-87. "DTC Logic". If DTC P1715 is displayed with DTC U1010, first perform the trouble diagnosis for DTC U1010. Refer to EC-88, "DTC Logic" Ε If DTC P1715 is displayed with DTC P0335, first perform the trouble diagnosis for DTC P0335. Refer to EC-147, "DTC Logic". If DTC P1715 is displayed with DTC P0340, first perform the trouble diagnosis for DTC P0340. Refer F to EC-151, "DTC Logic". If DTC P1715 is displayed with DTC P0605, first perform the trouble diagnosis for DTC P0605. Refer to EC-162, "DTC Logic". G DTC No. DTC detecting condition Possible cause Trouble diagnosis name Harness or connectors (The CAN communication line is open or short-Н Primary speed sensor signal is different ed) Input speed sensor from the theoretical value calculated by (Primary speed sensor) Harness or connectors P1715 ECM from secondary speed sensor signal (Primary speed sensor circuit is open or short-(TCM output) and engine rpm signal. ed) TCM DTC CONFIRMATION PROCEDURE 1.PRECONDITIONING If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test. K >> GO TO 2. L 2. PERFORM DTC CONFIRMATION PROCEDURE Start engine and drive the vehicle at more than 50 km/h (31 MPH) for at least 5 seconds. 1. Check 1st trip DTC. 2. M Is 1st trip DTC detected? YES >> Go to EC-217, "Diagnosis Procedure". NO >> INSPECTION END Ν Diagnosis Procedure INFOID:00000004900005 CHECK DTC WITH TCM 0 Check DTC with TCM. Refer to TM-36. "Diagnosis Description". Is DTC detected? Р NO >> GO TO 2. >> Perform trouble shooting relevant to DTC indicated. YES 2.REPLACE TCM

P1715 INPUT SPEED SENSOR (PRIMARY SPEED SENSOR)

Replace TCM.

www.digitalkhodro.com

>> INSPECTION END

www.digitalkhodro.com

#### P1805 BRAKE SWITCH

www.digitalkhodro.com

[MR20DE]

#### < COMPONENT DIAGNOSIS >

## P1805 BRAKE SWITCH

#### Description

INFOID:000000004900006

INFOID:000000004900007

Brake switch signal is applied to the ECM through the stop lamp switch when the brake pedal is depressed. This signal is used mainly to decrease the engine speed when the vehicle is driving.

#### DTC Logic

#### .

#### DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name DTC detecting condition		Possible cause
P1805	Brake switch	A brake switch signal is not sent to ECM for ex- tremely long time while the vehicle is driving.	<ul> <li>Harness or connectors (Stop lamp switch circuit is open or short- ed.)</li> <li>Stop lamp switch</li> </ul>

#### DTC CONFIRMATION PROCEDURE

#### 1.PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON.

- 2. Fully depress the brake pedal for at least 5 seconds.
- 3. Erase DTC.
- 4. Check 1st trip DTC.

#### is 1st trip DTC detected?

YES >> Go to EC-218. "Diagnosis Procedure".

## NO >> INSPECTION END

#### Diagnosis Procedure

INFCID:0000000004900008

#### 1.CHECK STOP LAMP SWITCH CIRCUIT

- 1. Turn ignition switch OFF.
- 2. Check the stop lamp when depressing and releasing the brake pedal.

Brake pedal	Stop lamp
Fully released	Not illuminated
Slightly depressed	Illuminated

#### Is the inspection result normal?

YES >> GO TO 4

NO >> GO TO 2

## 2. CHECK STOP LAMP SWITCH POWER SUPPLY CIRCUIT

- 1. Disconnect stop lamp switch harness connector.
- 2. Check the voltage between stop lamp switch harness connector and ground.

Stop lamp	o switch	Crowned	Voltage
Connector	Terminal	Ground	
E114 (M/T)			Detter h
E115 (CVT)		Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 4.

NO >> GO TO 3.

**3.**DETECT MALFUNCTIONING PART

Check the following.

## www.digitalkhodro.com

www.digitalkhodro.com

		1. A. S.	P1805	BRAKE SWITCH	
< COMPO	NENT DIAG	ANOSIS >		· •	[MR20DE]
• 10A fuse			stop lamp	switch and battery	• A
	Popair opa	n circuit or she	ort to arou	nd or short to power in harness or	connectors.
			_	AL CIRCUIT FOR OPEN AND SH	
		arness connec		на страна н Посто на страна на стр	·
2. Check	the continui	ty between EC	M harnes	s connector and stop lamp switch	harness connector.
E	CM	Stop lamp	switch		D
Connector	Terminal	Connector	Terminal	Continuity	
E16	99	E114 (M/T) E115 (CVT)	2	Existed	E
3. Also ch	neck harnes:	s for short to g	round and	short to power.	
	ection result	normal?		:	F
-	• GO TO 6. • GO TO 5.				
-			ат		
Check the					G
		short between	ECM and	stop lamp switch	
					н
0			ort to grou	nd or short to power in harness or	connectors.
6.CHECK	STOP LAM	P SWITCH			
			tion (Stop	Lamp Switch)".	
	ection result	normal?			
	> GO TO 7.	op lamp switch	ر جر ال	المايين سامانه د	ſ
_					
		ittent Incident".			——— К
	-00, 100011				
· >>		ON END		1	• •
Compon	ent Inspe	ction (Stop	Lamp S	witch)	INFOID:000000004900009
	•	· ·			
<b>1.</b> CHECK	STOP LAM	P SWITCH-I			M
	nition switch				
		mp switch harr tv between sto		ector. /itch terminals under the following	conditions. N
		<b>,</b>	F:- F		
Terminals	C	ondition	Continu	ity	
1 and 2	Brake pedal	Fully released	Not exis	ted	0
	Diake peual	Slightly depresse	ed Existe	d	
	ection result				Р
	> INSPECTI > GO TO 2.	ON END		1	
•		P SWITCH-II			
			on Defe-	to DD 0. Homestics and Advision	ant" / UD) RR 52 "Increa
	stop lamp s d Adjustmer			to BR-8. "Inspection and Adjustr	<u>ent</u> (LIIV), <u>DR-02, Hispet-</u>
			p lamp sw	vitch terminals under the following	conditions.

ŀ,

## EC-219

## P1805 BRAKE SWITCH

#### < COMPONENT DIAGNOSIS >

US BRAKE SWITCH

www.digitalkhodro.com

[MR20DE]

Terminals	Condition		Continuity
1 and 2	Brake pedal	Fully released	Not existed
	Diake pedal	Slightly depressed	Existed

#### . Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace stop lamp switch.

حيجيتا حوده

شرکت دیجیتال خودرو سامانه (مسئولیت محدود)

## اولین سامانه دیجیتال تعمیر کاران خودرو در ایران

۶. ...

.

001 60

021-62999292

EC-220

## P2122, P2123 APP SENSOR

#### < COMPONENT DIAGNOSIS >

P2122, P2123 APP SENSOR

### Description

The accelerator pedal position sensor is installed on the upper end of the accelerator pedal assembly. The sensor detects the accelerator position and sends a signal to the ECM.

Accelerator pedal position sensor has two sensors. These sensors are a kind of potentiometers which transform the accelerator pedal position into output voltage, and emit the voltage signal to the ECM. In addition, these sensors detect the opening and closing speed of the accelerator pedal and feed the voltage signals to the ECM. The ECM judges the current opening angle of the accelerator pedal from these signals and controls the throttle control motor based on these signals.



Idle position of the accelerator pedal is determined by the ECM receiving the signal from the accelerator pedal position sensor. The ECM uses this signal for the engine operation such as fuel cut.

#### DTC Logic

#### DTC DETECTION LOGIC

#### NOTE:

If DTC P2122 or P2123 is displayed with DTC P1229, first perform the trouble diagnosis for DTC P1229. Refer to EC-202, "DTC Logic".

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P2122	Accelerator pedal posi- tion sensor 1 circuit low input	An excessively low voltage from the APP sen- sor 1 is sent to ECM.	Harness or connectors     (APP sensor 1 circuit is open or shorted.)
P2123	Accelerator pedal posi- tion sensor 1 circuit high input	An excessively high voltage from the APP sensor 1 is sent to ECM.	Accelerator pedal position sensor (APP sensor 1)

#### DTC CONFIRMATION PROCEDURE

#### 1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

#### **TESTING CONDITION:**

Before performing the following procedure, confirm that battery voltage is more than 8V at idle.

#### >> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

Start engine and let it idle for 1 second. 1.

2. Check DTC.

#### Is DTC detected?

>> Go to EC-221. "Diagnosis Procedure". YES

>> INSPECTION END NO

#### **Diagnosis** Procedure

1. CHECK GROUND CONNECTION

1. Turn ignition switch OFF.

Check ground connection E21 and E38. Refer to Ground Inspection in GI-40, "Circuit Inspection". 2.

Is the inspection result\_normal?

YES >> GO TO 2.

### 021-62999292

www.digitalkhodro.com

#### [MR20DE]

INFOID:000000004900010

INFO/D-000000004900011

А

F

G

Η

Κ

L

М

N

0

p

INFOID:000000004900012

## P2122, P2123 APP SENSOR

[MR20DE]

< COMPONENT DIAGNOSIS >

NO >> Repair or replace ground connection.

2. CHECK APP SENSOR 1 POWER SUPPLY CIRCUIT

1. Disconnect accelerator pedal position (APP) sensor harness connector.

2. Turn ignition switch ON.

3. Check the voltage between APP sensor harness connector and ground.

APP s	sensor	Ground	Voltage	
Connector Terminal			vollage	
E110	. 4	Ground	Approx. 5V	

Is the inspection result normal?

YES >> GO TO 3.

NO >> Repair open circuit or short to ground or short to power in harness or connectors.

**3.**CHECK APP SENSOR 1 GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.

2. Disconnect ECM harness connector.

3. Check the continuity between APP sensor harness connector and ECM harness connector.

APP s	sensor	EC	CM	Continuity
Connector	Terminal	Connector	Terminal	Continuity
E110	2	E16	111	Existed

Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 4.

NO >> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK APP SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

Check the continuity between APP sensor harness connector and ECM harness connector.

APP s	opeor
AFFS	ELISO

APP s	ensor	ECM		Continuity
Connector Terminal		Connector	Terminal	Continuity
E110	3	E16	110	Existed

2. Also check harness for short to ground and short to power.

#### Is the inspection result normal?

YES >> GO TO 5.

NO >> Repair open circuit or short to ground or short to power in harness or connectors.

**5.**CHECK APP SENSOR

Refer to EC-223, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 7.

NO >> GO TO 6.

**6.**REPLACE ACCELERATOR PEDAL ASSEMBLY

1. Replace accelerator pedal assembly.

2. Go to EC-223. "Special Repair Requirement".

#### >> INSPECTION END

**/**.CHECK INTERMITTENT INCIDENT

Refer to GI-38, "Intermittent Incident".

>> INSPECTION END

## P2122, P2123 APP SENSOR

< COMPONENT DIAGNOSIS >

#### **Component Inspection**

1. CHECK ACCELERATOR PEDAL POSITION SENSOR

- Reconnect all harness connectors disconnected. 1.
- 2. Turn ignition switch ON.
- Check the voltage between ECM harness connector terminals. 3.

ECM					
Connector	+ -		Condition	Voltage	
Connector	Terminal	Terminal	-		
	110 (APP sensor 1 signal)	111	Accelerator pedal: Fully released	0.6 - 0.9V	
540		111	Accelerator pedal: Fully depressed	3.9 - 4.7V	
E16	103 (APP sensor 2 signal)		Accelerator pedal: Fully released	0.3 - 0.6V	
			Accelerator pedal: Fully depressed	1.95 - 2.4V	

#### Is the inspection result normal?

YES >> INSPECTION END

NO >> GO TO 2.

#### 2.REPLACE ACCELERATOR PEDAL ASSEMBLY

1.

Replace accelerator pedal assembly. Go to EC-223, "Special Repair Requirement". 2.

>> INSPECTION END

Special Repair Requirement

**1.**PERFORM ACCELERATOR PEDAL RELEASED POSITION LEARNING

Refer to EC-14, "ACCELERATOR PEDAL RELEASED POSITION LEARNING : Special Repair Requirement".

>> GO TO 2.

2. PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Refer to EC-15, "THROTTLE VALVE CLOSED POSITION LEARNING : Special Repair Requirement".

>> GO TO 3.

 $\mathbf{3}.$ PERFORM IDLE AIR VOLUME LEARNING

Refer to EC-15, "IDLE AIR VOLUME LEARNING : Special Repair Requirement".

>> END

## www.digitalkhodro.com

[MR20DE]

INFOID:000000004900013

А

EC

С

D

Ε

۴

G

Н

J

K

L

Μ

N

0

р

INFOID:000000004900014

## P2127, P2128 APP SENSOR

#### < COMPONENT DIAGNOSIS >

P2127, P2128 APP SENSOR

## Description

The accelerator pedal position sensor is installed on the upper end of the accelerator pedal assembly. The sensor detects the accelerator position and sends a signal to the ECM.

Accelerator pedal position sensor has two sensors. These sensors are a kind of potentiometers which transform the accelerator pedal position into output voltage, and emit the voltage signal to the ECM. In addition, these sensors detect the opening and closing speed of the accelerator pedal and feed the voltage signals to the ECM. The ECM judges the current opening angle of the accelerator pedal from these signals and controls the throttle control motor based on these signals. Idle position of the accelerator pedal is determined by the ECM



receiving the signal from the accelerator pedal position sensor. The ECM uses this signal for the engine operation such as fuel cut.

## DTC Logic

#### DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P2127	Accelerator pedal posi- tion sensor 2 circuit low input	An excessively low voltage from the APP sen- sor 2 is sent to ECM.	Harness or connectors     (APP sensor 2 circuit is open or shorted.)     [Crankshaft position sensor (POS) circuit
P2128	Accelerator pedal posi- tion sensor 2 circuit high input	An excessively high voltage from the APP sen- sor 2 is sent to ECM.	<ul> <li>is shorted.] (Refrigerant pressure sensor circuit is shorted.)</li> <li>Accelerator pedal position sensor (APP sensor 2)</li> <li>Crankshaft position sensor (POS)</li> <li>Refrigerant pressure sensor</li> </ul>

#### DTC CONFIRMATION PROCEDURE

#### 1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

#### **TESTING CONDITION:**

Before performing the following procedure, confirm that battery voltage is more than 8V at idle.

#### >> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Start engine and let it idle for 1 second.

#### 2. Check DTC.

Is DTC detected?

YES >> Go to EC-224. "Diagnosis Procedure".

NO >> INSPECTION END

#### Diagnosis Procedure

1. CHECK GROUND CONNECTION

1. Turn ignition switch OFF.

2. Check ground connection E21 and E38. Refer to Ground Inspection in GI-40. "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.

[MR20DE]

INFOID:000000004900015

INFOID:000000004900016

2.CHECK A 1. Disconne 2. Turn igni	Repair or		P212	27, P2128	APP S	ENSOR	www.digitalkhodro	.0
2.CHECK A 1. Disconne 2. Turn igni	PP SEN	AGNOSIS :		· .			[MR20DE]	
1. Disconne 2. Turn igni		r replace gr	ound coni	nection.				
2. Turn igni	· · · · · · · · · · · · · · · · · · ·	SOR 2 PO	WER SUF	PPLY CIRCL	JIT-I	-		1
2. Turn Igni 3. Check th			al position	(APP) sens	or harnes	s connector.	1999 - 1999 - 1999 - 1999 - 1999 - 1999 - 1999 - 1999 - 1999 - 1999 - 1999 - 1999 - 1999 - 1999 - 1999 - 1999 -	
	ition swit ne voltag	ch ON. e between	APP sens	or harness o	connector	and ground.		E
						<b>J</b>		
APP ser	isor	Ground	Voltage					(
	Terminal			¥				
E110	5	-	pprox. 5V	:				
s the inspect								
	GO TO 6 GO TO 3							
3. CHECK A	PP SEN	ISOR 2 PO	WER SUP		ЛТ-П			1
. Turn igni				<u>.</u>		<u></u>		
2. Disconne	ect ECM	harness co	onnector.					
3. Check th	ne contin	uity betwee	en APP se	ensor harnes	s connect	or and ECM hai	rness connector.	
APP ser	nsor	E	CM	<u>·</u> _				
	Terminal	Connector	Terminal	Continuity				
E110	5	E16	102	Existed				
s the inspec	tion rest	It normal?						
	GO TO 4						Q	
NO >> F	Re <mark>p</mark> air o	pen circuit.						
<ol> <li>CHECK S</li> </ol>	SENSOR	POWER S	SUPPLY C	RCUITS				
Check harne	ess for sh	ort to powe	er and sho	ort to ground	, between	the following te	rminals.	
				1				
ECM	ں حود	ميركارا	سالىغە	Sensor	ین سام	<u> 191 - N</u>		
Connector 1	Terminal		Item		Connector	Terminal		
F8	74	Refrigerant p		sor .	E49	3		
	75	CKP sensor	(POS)		F20 E110	1 5		
E16	102	APP sensor			EIIU	5		
	tion resu							
			und or sho					
YES >> (	GO TO 5 Repair s	ποπ το ατοι	แน่นเรารถบ	in to power i	n narness	or connectors.		
YES >> ( NO >> I	Repair s	-		on to power i	n narness	or connectors.		
YES >> ( NO >> I D.CHECK (	Repair s COMPOI	-		nt to power i	n namess	or connectors.		ļ
YES >> C NO >> D D.CHECK C Check the fo Crankshaft	Repair s COMPON Illowing.	NENTS	OS) (Refe	r to EC-150	"Compor	ent Inspection".	;	
YES >> ( NO >> I D.CHECK C Check the fo Crankshaft	Repair s COMPON Illowing.	NENTS	OS) (Refe	r to EC-150	"Compor	ent Inspection".	;	
YES >> 0 NO >> 1 D.CHECK 0 Check the fo Crankshaft Refrigerant is the inspec	Repair s COMPON Illowing. t position t pressu	NENTS I sensor (Pre sensor (I ult normal?	OS) (Refe	r to EC-150	"Compor	ent Inspection".	;	
YES >> ( NO >> I D.CHECK C Check the fo Crankshaft Refrigerant is the inspec YES >> (	Repair s COMPON Illowing. t position t pressu tion resu GO TO	NENTS a sensor (Pare sensor (I alt normal? 10.	OS) (Refe Refer to <u>E</u>	er to <u>EC-150</u> <u>C-256, "Diac</u> I	"Compor	ent Inspection".	;	
NO >> I 5.CHECK C Check the fo Crankshaft Refrigerant Is the inspec YES >> 0	Repair s COMPON Illowing. t position t pressu tion resu GO TO Replace	NENTS I sensor (Pre sensor (I ult normal? 10. malfunctio	OS) (Refe Refer to <u>E</u> ning comp	er to <u>EC-150,</u> <u>C-256, "Diac</u> I	"Compor gnosis Pro	ent Inspection". cedure".)	;	

.

## P2127, P2128 APP SENSOR

www.digitalkhodro.com

[MR20DE]

#### < COMPONENT DIAGNOSIS >

APP s	ensor	EC	М	Continuity	
Connector	Terminal	Connector Terminal			
E110	1	E16	104	Existed	

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 7.

NO >> Repair open circuit or short to ground or short to power in harness or connectors.

7. CHECK APP SENSOR 2 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check the continuity between APP sensor hamess connector and ECM hamess connector.

APP s	sensor	EC	М	Continuity
Connector	Connector Terminal		Terminal	Continuity
E110	6	E16	103	Existed

#### 2. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 8.

NO >> Repair open circuit or short to ground or short to power in harness or connectors.

8.CHECK APP SENSOR

Refer to EC-226. "Component Inspection".

Is the inspection result normal?

YES >> GO TO 10. NO >> GO TO 9.

9.REPLACE ACCELERATOR PEDAL ASSEMBLY

1. Replace accelerator pedal assembly.

2. Go to EC-227, "Special Repair Requirement".

#### >> INSPECTION END

## **10.**CHECK INTERMITTENT INCIDENT

Refer to GI-38. "Intermittent Incident".

>> INSPECTION END

#### **Component Inspection**

INFOID:000000004900018

## 1. CHECK ACCELERATOR PEDAL POSITION SENSOR

- 1. Reconnect all harness connectors disconnected.
- 2. Turn ignition switch ON.
- 3. Check the voltage between ECM harness connector terminals.

	ECM				
Connector	+		Condițion	Voltage	
	Terminat	Terminal			
	110	111	Accelerator pedal: Fully released	0.6 - 0.9V	
E16	(APP sensor 1 signal)		Accelerator pedal: Fully depressed	3.9 - 4.7V	
210	103	104	Accelerator pedal: Fully released	0.3 - 0.6V	
	(APP sensor 2 signal)	104	Accelerator pedal: Fully depressed	1.95 - 2.4V	

Is the inspection result normal?

## 021-62999292



www.digitalkhodro.com

## 

www.digitalkhodro.com

<pre>P2127, P2128 APP SENSO &lt; COMPONENT DIAGNOSIS &gt;</pre>	[MR20DE]
YES >> INSPECTION END NO >> GO TO 2.	· · ·
2.REPLACE ACCELERATOR PEDAL ASSEMBLY	
<ol> <li>Replace accelerator pedal assembly.</li> <li>Go to EC-227, "Special Repair Requirement".</li> </ol>	· · · · · · · · · · · · · · · · · · ·
Z. OU IO <u>LO 227, Openiul Hopen Hegenoment</u> .	
>> INSPECTION END	
Special Repair Requirement	INFOID:000000004900019
1.PERFORM ACCELERATOR PEDAL RELEASED POSITION LEARN	
Refer to EC-14, "ACCELERATOR PEDAL RELEASED POSITION LEA	RNING : Special Repair Requirement".
>> GO TO 2.	· · ·
2.PERFORM THROTTLE VALVE CLOSED POSITION LEARNING	
Refer to EC-15, "THROTTLE VALVE CLOSED POSITION LEARNING	: Special Repair Requirement".
>> GO TO 3.	
3. PERFORM IDLE AIR VOLUME LEARNING	
Refer to EC-15, "IDLE AIR VOLUME LEARNING : Special Repair Requ	uirement".
>> END	
شرکت دیجیتال خودرو سامانه (مسئولیت محد	
اولین سامانه دیجیتال تعمیرکاران خودرو در ایر	

ł i

## P2135 TP SENSOR

www.digitalkhodro.com

[MR20DE]

INFOID 000000004900020

INFOID:000000000490002

< COMPONENT DIAGNOSIS >

P2135 TP SENSOR

Description

Electric throttle control actuator consists of throttle control motor, throttle position sensor, etc. The throttle position sensor responds to the throttle valve movement.

The throttle position sensor has two sensors. These sensors are a kind of potentiometers which transform the throttle valve position into output voltage, and emit the voltage signal to the ECM. In addition, these sensors detect the opening and closing speed of the throttle valve and feed the voltage signals to the ECM. The ECM judges the current opening angle of the throttle valve from these signals and the ECM controls the throttle control motor to make the throttle valve opening angle properly in response to driving condition.



DTC Logic

#### DTC DETECTION LOGIC

#### NOTE:

If DTC P2135 is displayed with DTC P1229, first perform the trouble diagnosis for DTC P1229. Refer to EC-202, "DTC Logic".

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P2135	Throttle position sensor circuit range/perfor- mance	Rationally incorrect voltage is sent to ECM compared with the signals from TP sensor 1 and TP sensor 2.	<ul> <li>Harness or connector (TP sensor 1 and 2 circuit is open or shorted.)</li> <li>Electric throttle control actuator (TP sensor 1 and 2)</li> </ul>

#### DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

#### TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 8V at idle.

>> GO TO 2.

## 2. PERFORM DTC CONFIRMATION PROCEDURE

- 1. Start engine and let it idle for 1 second.
- 2. Check DTC.

#### Is DTC detected?

YES >> Go to <u>EC-228, "Diagnosis Procedure"</u>. NO >> INSPECTION END

#### Diagnosis Procedure

INFOID:000000004900022

#### 1.CHECK GROUND CONNECTION

- 1. Turn ignition switch OFF.
- 2. Check ground connection E21 and E38. Refer to Ground Inspection in GI-40. "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.

NO >> Repair or replace ground connection.

2. CHECK THROTTLE POSITION SENSOR POWER SUPPLY CIRCUIT

1. Disconnect electric throttle control actuator harness connector.

## www.digitalkhodro.com

-

•

# P2135 TP SENSOR

## www.digitalkhodro.com

<ol><li>Turn ignitic</li></ol>				
3. Check the	voltage betv	veen ele	ctric throttle	control actuator harness connector and ground.
Electric throttle c	ontrol actuator	Caravard	Maltana	$\cdot$ $\cdot$ $\cdot$ $\cdot$
Connector	Terminal	Ground	Voltage	,
F29	1	Ground	Approx. 5V	
Is the inspectio	n result norr	<u>nal?</u>		
NO >> Re			-	nd or short to power in harness or connectors. ROUND CIRCUIT
2. Disconnect	on switch OF t ECM harne continuity b	ess conn		tle control actuator harness connector and ECM harness c
	,	• .	· · · · · ·	• • • • • • • • • • • • • • • • • • •
Electric throttle c			ECM	- Continuity
Connector	Terminal	Connect		
F29	4	F8	36	short to power.
	• •		_	nd or short to power in harness or connectors.
4.CHECK THE 1. Check the nector.	ROTTLE PC	SITION	SENSOR IN electric thrott	
4.CHECK THI 1. Check the nector. Electric throttle co	ROTTLE PC continuity b	etween	SENSOR IN electric thrott	NPUT SIGNAL CIRCUIT
4.CHECK THE 1. Check the nector. Electric throttle co Connector	ROTTLE PC continuity b ontrol actuator Terminal	OSITION etween Connect	SENSOR IN electric thrott ECM tor Terminal	NPUT SIGNAL CIRCUIT
4. CHECK THE 1. Check the nector. Electric throttle co Connector F29	ROTTLE PC continuity b ontrol actuator Terminal 2	OSITION etween Connect F8	SENSOR IN electric thrott	NPUT SIGNAL CIRCUIT
4.CHECK THI 1. Check the nector. Electric throttle connector F29 F29 2. Also check Is the inspectio	ROTTLE PC continuity b ontrol actuator Terminal 2 3 x harness for	Connect F8 F8 F8	SENSOR IN electric throtte ECM for Terminal 33 34	VPUT SIGNAL CIRCUIT tile control actuator harness connector and ECM harness connector and ECM harness connector and ECM harness continuity
4.CHECK THE 1. Check the nector. Electric throttle cr Connector F29 F29 2. Also check ls the inspectio YES >> GC NO >> Re 5.CHECK THE	ROTTLE PC continuity b ontrol actuator Terminal 2 3 c harness for n result norr 0 TO 5. pair open ci ROTTLE PC	Connect F8 Short to mal? SITION	SENSOR IN electric thrott	VPUT SIGNAL CIRCUIT tile control actuator harness connector and ECM harness c Continuity
4. CHECK THI 1. Check the nector. Electric throttle connector F29 F29 2. Also check Is the inspectio YES $>>$ GC NO $>>$ Re 5. CHECK THI Refer to EC-23 Is the inspectio YES $>>$ GC NO $>>$ GC	ROTTLE PC continuity b ontrol actuator Terminal 2 3 c harness for n result norr D TO 5. pair open ci ROTTLE PC 0, "Compon n result norr D TO 7. D TO 6.	Connect F8 F8 Short to mal? SITION ent Insp mal?	SENSOR IN electric thrott for Terminal 33 34 ground and short to groun SENSOR ection".	Continuity Existed I short to power in harness or connectors.
4. CHECK THI 1. Check the nector. Electric throttle connector F29 F29 2. Also check is the inspectio YES $>>$ GC NO $>>$ Re 5. CHECK THI Refer to EC-23 is the inspectio YES $>>$ GC NO $>>$ GC 6. REPLACE E 1. Replace el	ROTTLE PC continuity b ontrol actuator Terminal 2 3 c harness for n result norr D TO 5. pair open ci ROTTLE PC 0, "Compon n result norr D TO 7. D TO 6. ELECTRIC T ectric throttle	etween of connect F8 F8 short to mal? rcuit or s OSITION ent Insp mal? HROTT e contro	SENSOR IN electric thrott for Terminal 33 34 ground and short to groun SENSOR ection".	Continuity Existed I short to power.
4. CHECK THI 1. Check the nector. Electric throttle connector F29 F29 2. Also check is the inspectio YES $>>$ GC NO $>>$ Re 5. CHECK THI Refer to EC-23 is the inspectio YES $>>$ GC NO $>>$ GC 6. REPLACE E 1. Replace el 2. EC-230, "S >> INS 7. CHECK INT	ROTTLE PC continuity b ontrol actuator Terminal 2 3 c harness for n result norr D TO 5. pair open ci ROTTLE PC 0, "Compon n result norr D TO 7. D TO 6. ELECTRIC T ectric throttle SPECTION ERMITTEN	Connect Connect F8 F8 short to mal? rcuit or s SITION ent Insp mal? HROTT e contro air Requi END T INCID	SENSOR IN electric thrott for Terminal 33 34 ground and short to groun SENSOR ection".	Continuity Existed I short to power in harness or connectors.
4. CHECK THE 1. Check the nector. Electric throttle connector F29 F29 2. Also check Is the inspection YES $>>$ GC NO $>>$ Re 5. CHECK THE Refer to EC-23 Is the inspection YES $>>$ GC NO $>>$ GC AD Solution Solution Solution Solution Solution Solution Solution Solution Solutio Solution Solution Solution Solutio Solution Solution	ROTTLE PC continuity b ontrol actuator Terminal 2 3 c harness for n result norr D TO 5. pair open ci ROTTLE PC 0, "Compon n result norr D TO 7. D TO 6. ELECTRIC T ectric throttle SPECTION ERMITTEN	Connect Connect F8 F8 short to mal? rcuit or s SITION ent Insp mal? HROTT e contro air Requi END T INCID	SENSOR IN electric thrott for Terminal 33 34 ground and short to groun SENSOR ection".	Continuity Existed I short to power in harness or connectors.

## P2135 TP SENSOR

## www.digitalkhodro.com

#### < COMPONENT DIAGNOSIS >

#### **Component Inspection**

[MR20DE]

INFOID:000000004900023

INFOID:00000000490002

## 1. CHECK THROTTLE POSITION SENSOR

- 1. Turn ignition switch OFF.
- 2. Reconnect all harness connectors disconnected.
- 3. Perform EC-15, "THROTTLE VALVE CLOSED POSITION LEARNING : Special Repair Requirement".
- 4. Turn ignition switch ON.
- 5. Set shift lever to D (CVT) or 1st (M/T) position.
- 6. Check the voltage between ECM harness connector terminals.

ECM				
Connector	onnector + Terminal		Condition	Voltage
COMINECTOR				·
	33 (TP sensor 1 signal) F8 34		Accelerator pedal: Fully released	More than 0.36V
59			Accelerator pedal: Fully depressed	Less than 4.75V
, 0			Accelerator pedal: Fully released	Less than 4.75V
	(TP sensor 2 signal)		Accelerator pedal: Fully depressed	More than 0.36V

Is the inspection result normal?

YES >> INSPECTION END

NO >> GO TO 2.

## 2. REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

- 1. Replace electric throttle control actuator.
- Go to <u>EC-230</u>, "Special Repair Requirement".

#### >> INSPECTION END

Special Repair Requirement

## 1.PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Refer to EC-15, "THROTTLE VALVE CLOSED POSITION LEARNING : Special Repair Requirement"

#### >> GO TO 2.

## 2.PERFORM IDLE AIR VOLUME LEARNING

Refer to EC-15. "IDLE AIR VOLUME LEARNING : Special Repair Requirement"

>> END

## P2138 APP SENSOR

#### < COMPONENT DIAGNOSIS >

P2138 APP SENSOR

## Description

The accelerator pedal position sensor is installed on the upper end of the accelerator pedal assembly. The sensor detects the accelerator position and sends a signal to the ECM.

Accelerator pedal position sensor has two sensors. These sensors are a kind of potentiometers which transform the accelerator pedal position into output voltage, and emit the voltage signal to the ECM. In addition, these sensors detect the opening and closing speed of the accelerator pedal and feed the voltage signals to the ECM. The ECM judges the current opening angle of the accelerator pedal from these signals and controls the throttle control motor based on these signals.



Idle position of the accelerator pedal is determined by the ECM receiving the signal from the accelerator pedal position sensor. The ECM uses this signal for the engine operation such as fuel cut.

#### DTC Logic

INFOID 000000004900026

DTC DETECTION LOGIC

#### NOTE:

If DTC P2138 is displayed with DTC P1229, first perform the trouble diagnosis for DTC P1229. Refer to EC-202, "DTC Logic".

	Trouble diagnosis name	DTC detecting condition	Possible cause
2138 g	Accelerator pedal posi- tion sensor circuit range/ performance	Rationally incorrect voltage is sent to ECM compared with the signals from APP sensor 1 and APP sensor 2.	<ul> <li>Harness or connector (APP sensor 1 and 2 circuit is open or shorted.) [Crankshaft position sensor (POS) circuit is shorted.) (Refrigerant pressure sensor circuit is shorted.)</li> <li>Accelerator pedal position sensor (APP sensor 1 and 2)</li> <li>Crankshaft position sensor (POS)</li> <li>Refrigerant pressure sensor</li> </ul>
	FIRMATION PROCI	EDURE	

Before performing the following procedure, confirm that battery voltage is more than 10V at idle.

#### >> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

- 1. Start engine and let it idle for 1 second.
- 2. Check DTC.

#### Is DTC detected?

- YES >> Go to EC-231, "Diagnosis Procedure".
- NO >> INSPECTION END

#### **Diagnosis Procedure**

**1.**CHECK GROUND CONNECTION

1. Turn ignition switch OFF.

#### 021-62999292

[MR20DE]

INEO/D-0000000004900025

www.digitalkhodro.com

A

F

G

Н

N

O

P

INFOID:00000000490002.

## P2138 APP SENSOR

#### www.digitalkhodro.com

#### < COMPONENT DIAGNOSIS >

[MR20DE]

2. Check ground connection E21 and E38. Refer to Ground Inspection in GI-40. "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.

NO >> Repair or replace ground connection.

2.CHECK APP SENSOR 1 POWER SUPPLY CIRCUIT

Disconnect accelerator pedal position (APP) sensor harness connector. 1.

2. Turn ignition switch ON.

Check the voltage between APP sensor harness connector and ground. 3.

APP s	sensor	Ground	Voltage	
Connector	Terminal			
E110	4	Ground	Approx. 5V	

Is the inspection result normal?

YES >> GO TO 3.

NO >> Repair open circuit or short to ground or shot to power in harness or connectors.

## **3.**CHECK APP SENSOR 2 POWER SUPPLY CIRCUIT-I

Check the voltage between APP sensor harness connector and ground.

APP	sensor	Ground	Voltage	
Connector	Connector Terminal		Voltage	
E110	5	Ground	Approx. 5V	

Is the inspection result normal?

YES >> GO TO 7. NO

>> GO TO 4.

4. CHECK APP SENSOR 2 POWER SUPPLY CIRCUIT-II

1. Turn ignition switch OFF.

#### Disconnect ECM harness connector. 2.

Check the continuity between APP sensor harness connector and ECM harness connector. 3.

APP	sensor	EC	Continuitu	
Connector	Terminal	Connector Terminal		Continuity
· E110	5	E16	102	Existed

Is the inspection result normal?

YES >> GO TO 5.

NO >> Repair open circuit.

5. CHECK SENSOR POWER SUPPLY CIRCUITS

Check harness for short to power and short to ground, between the following terminals.

EC	M	Sensor		
Connector	Terminal	ltem -	Connector	Terminal
F8	74	Refrigerant pressure sensor	E49	3
FO	75	CKP sensor (POS)	.F20	1
E16	102	APP sensor	E110	5

Is the inspection result normal?

YES >> GO TO 6.

NO >> Repair short to ground or short to power in harness or connectors.

6.CHECK COMPONENTS

Check the following.

www.digitalkhodro.com

÷

## P2138 APP SENSOR

www.digitalkhodro.com

		P2138 APP SENSOR	
	IAGNOSIS >		[MR20DE]
Refrigerant press	ure sensor (Refe	(Refer to <u>EC-150, "Component Inspecti</u> r to <u>EC-256, "Diagnosis Procedure"</u> .)	ion".)
s the inspection res YES >> GO TO			_
	e malfunctioning	component.	E
CHECK APP SE	NSOR GROUN	CIRCUIT FOR OPEN AND SHORT	
	M harness conn	ector. PP sensor harness connector and ECM	harness connector.
	· .		
APP sensor	ECM Connector Termi	Continuity	
Connector Terminal 2	Connector Termi	<u>iai</u>	
E110	E16	Existed	
Also check har	ness for short to	ground and short to power.	
the inspection res			
YES >> GO TO			
	•	nort to ground or shot to power in harne	
	· ·	IGNAL CIRCUIT FOR OPEN AND SHO	
Check the cont	inuity between A	PP sensor harness connector and ECM	hamess connector.
APP sensor	ECM		
APP sensor		Continuity	
Connector Terminal	Connector   Termi	i lee	
	Connector Termi		
Connector Terminal E110 3 6	Connector Termi E16	Existed	
E110 3 6	E16 110	Existed	
E110 3 6 Also check har	E16 110 100 100 100	Existed	
E110 3 Also check hard the inspection resonance YES >> GO TO	E16 100 ness for short to sult normal? 9.	ground and short to power.	
E110 Also check hard the inspection res YES >> GO TO NO >> Repair	E16 110 100 100 100 100 100 100 1	Existed	ss or connectors.
E110 Also check hard the inspection res YES >> GO TO NO >> Repair CHECK APP SE	E16 110 100 100 100 100 100 100 1	Existed ground and short to power. nort to ground or shot to power in harne	ss or connectors.
E110 Also check hard the inspection resonance YES >> GO TO NO >> Repair CHECK APP SE efer to EC-233. "C	E16 100 100 100 100 100 100 100 1	Existed ground and short to power. nort to ground or shot to power in harne	ss or connectors.
E110 Also check hard the inspection res YES >> GO TO NO >> Repair CHECK APP SE efer to EC-233. "C the inspection res	E16 110 100 100 100 100 100 100 1	Existed ground and short to power. nort to ground or shot to power in harne	ss or connectors.
E110 Also check hard the inspection res YES >> GO TO NO >> Repair .CHECK APP SE efer to EC-233. "O the inspection res YES >> GO TO	E16 110 100 100 100 100 100 100 1	Existed ground and short to power. nort to ground or shot to power in harne	ss or connectors.
E110 Also check hard the inspection resolution YES >> GO TO NO >> Repair CHECK APP SE efer to EC-233. "C the inspection resolution YES >> GO TO NO >> GO TO NO >> GO TO	E16 110 100 100 100 100 100 100 1	Existed ground and short to power. nort to ground or shot to power in harne	ss or connectors.
E110 $\frac{3}{6}$ Also check hard the inspection restriction restrin	E16 110 100 100 100 100 100 100 1	Existed ground and short to power. nort to ground or shot to power in harne ection".	ss or connectors.
E110 $\frac{3}{6}$ Also check hard the inspection reserved by a second seco	E16 110 100 100 100 100 100 100 1	Existed ground and short to power. nort to ground or shot to power in harne ection".	ss or connectors.
E110 Also check hard the inspection reserved YES $>>$ GO TO NO $>>$ Repair CHECK APP SE efer to EC-233. "C the inspection reserved YES $>>$ GO TO NO $>>$ GO TO NO $>>$ GO TO O.REPLACE AC Replace accele Go to EC-234.	E16 110 100 100 100 100 100 100 1	Existed ground and short to power. nort to ground or shot to power in harne ection".	ss or connectors.
E110 Also check hard the inspection resolution YES $>>$ GO TO NO $>>$ Repair CHECK APP SE efer to EC-233. "Control the inspection resolution YES $>>$ GO TO NO $>>$ GO TO O.REPLACE AC Replace accele Go to EC-234. >> INSPE	E16 110 100 100 100 100 100 100 1	Existed ground and short to power. hort to ground or shot to power in harne ection". EDAL ASSEMBLY mbly. Requirement".	ss or connectors.
E110 Also check hard the inspection resolution YES $>>$ GO TO NO $>>$ Repair CHECK APP SE efer to EC-233. "C the inspection resolution YES $>>$ GO TO NO $>>$ GO TO NO $>>$ GO TO O.REPLACE AC Replace accele Go to EC-234. >> INSPE 1.CHECK INTER	E16 110 100 100 100 100 100 100 1	Existed ground and short to power. nort to ground or shot to power in harne ection". EDAL ASSEMBLY mbly. Requirement". DENT	ss or connectors.
E110 Also check hard the inspection res YES $>>$ GO TO NO $>>$ Repair CHECK APP SE refer to EC-233. "C the inspection res YES $>>$ GO TO NO $>>$ GO TO NO $>>$ GO TO O.REPLACE AC Replace accele Go to EC-234. >> INSPE 1.CHECK INTER	E16 110 100 100 100 100 100 100 1	Existed ground and short to power. nort to ground or shot to power in harne ection". EDAL ASSEMBLY mbly. Requirement". DENT	ss or connectors.
E110 Also check hard the inspection resident of the inspection resident	E16 110 100 100 100 100 100 100 1	Existed ground and short to power. nort to ground or shot to power in harne ection". EDAL ASSEMBLY mbly. Requirement". DENT	ss or connectors.
E110 Also check hard the inspection resident of the inspection of the inspection of the inspection of the inspection resident	E16 110 100 100 100 100 100 100 1	Existed ground and short to power. nort to ground or shot to power in harne ection". EDAL ASSEMBLY mbly. Requirement". DENT	· · · · · · · · · · · · · · · · · · ·
E110 Also check har the inspection resonance YES >> GO TO NO >> Repair CHECK APP SE efer to EC-233. "C the inspection resonance YES >> GO TO NO >> GO TO NO >> GO TO O.REPLACE AC Replace accele Go to EC-234. >> INSPEC 1.CHECK INTER refer to GI-38. "Inter >> INSPEC Component Inse	E16 110 100 100 100 100 100 100 1	nat         Existed         ground and short to power.         nort to ground or shot to power in harne.         ection".         EDAL ASSEMBLY         mbly.         Requirement".         DENT         "."	
E110 Also check har the inspection resonance YES >> GO TO NO >> Repair CHECK APP SE efer to EC-233. "C the inspection resonance YES >> GO TO NO >> GO TO NO >> GO TO O.REPLACE AC Replace accele Go to EC-234. >> INSPEC 1.CHECK INTER refer to GI-38. "Inter >> INSPEC Component Inse	E16 110 100 100 100 100 100 100 1	Existed ground and short to power. nort to ground or shot to power in harne ection". EDAL ASSEMBLY mbly. Requirement". DENT	· · · · · · · · · · · · · · · · · · ·

## P2138 APP SENSOR

[MR20DE]

#### < COMPONENT DIAGNOSIS >

3. Check the voltage between ECM harness connector terminals.

	ECM				
Connector	+	-	Condition	Voltage	
Connector	Terminal	Terminal	· · · ·		
	110	111	Accelerator pedal: Fully released	0.6 - 0.9V	
E16	(APP sensor 1 signal)	11)	Accelerator pedal: Fully depressed	3.9 - 4.7V	
	103	· 104	Accelerator pedal: Fully released	0.3 - 0.6V	
	(APP sensor 2 signal)	· 104	Accelerator pedal: Fully depressed	1.95 - 2.4V	

#### Is the inspection result normal?

YES >> INSPECTION END

NO >> GO TO 2.

## 2.REPLACE ACCELERATOR PEDAL ASSEMBLY

1. Replace accelerator pedal assembly.

2. Go to EC-234, "Special Repair Requirement".

>> INSPECTION END

Special Repair Requirement

INFOID:000000004900029

1. PERFORM ACCELERATOR PEDAL RELEASED POSITION LEARNING

Refer to EC-14, "ACCELERATOR PEDAL RELEASED POSITION LEARNING : Special Repair Requirement".

>> GO TO 2.

2.PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Refer to EC-15. "THROTTLE VALVE CLOSED POSITION LEARNING ; Special Repair Requirement".

>> GO TO 3.

3. PERFORM IDLE AIR VOLUME LEARNING

Refer to EC-15, "IDLE AIR VOLUME LEARNING : Special Repair Requirement".

>> END

## **••••**

## www.digitalkhodro.com

			AS	CD BRAKE SWITCH			
	NENT DIAG					[MR20DE]	
ASCD I	BRAKE S	WITCH					А
Descript	ion					INFOID:00000000490003	
ECM deter	cts the state	of the brake	e pedal by	D brake switch is turned OFF a / this input of two kinds (ON/OF e ASCD function.		vitch is turned ON	· EC
Compon	ent Funct	ion Chec	k			INFOID:00000000490003	"C
1.CHECK	FOR ASCD	BRAKE S	WITCH F	UNCTION			_
	gnition switch the voltage		CM harne	ess connector terminals.			D
	ECI	vi					E
Connector	+	-	-	Condition		Voltage	
	Term	ninal	Terminal				F
E16	10 (ASCD brake	-	108	Brake pedal (CVT) Brake pedal and clutch pedal (M/T)	Slightly depressed	Approx. 0V	
<b></b>		switch signaly		Diake pedar and cloter pedar (wir f)	Fully released	Battery voltage	G
Diagnos 1.CHECH 1. Turn in 2. Discon 3. Turn in	gnition switch nnect ASCD gnition switch	KE SWITC OFF. brake switc ON.	H POWE	R SUPPLY CIRCUIT-I	d ground.	INFOID:00000000490003	H 1 -
ASCD b Connector	Terminal	Ground	Voltage	<b>_</b>			K
E112	1		ittery voltag	e			L
YES > NO-1 > NO-2 >	ection result > GO TO 7. > CVT mode > M/T model CT MALFUNC	ls: GO TO s: GO TO 3	3.	· · · · · ·			М
• 10 A fus	connectors l e (No.4)		en ASCD	) brake switch and fuse	· · ·		- N 0
~	• •			ground or short to power in har ER SUPPLY CIRCUIT	ness or connecto	rs.	P

- 1. Turn ignition switch OFF.
- Disconnect ASCD clutch switch harness connector. 2.
- 3. Turn ignition switch ON.
- 4. Check the voltage between ASCD clutch switch harness connector and ground.

## ASCD BRAKE SWITCH

www.digitalkhodro.com

[MR20DE]

< COMPONENT DIAGNOSIS >

ASCD c	lutch switch	Ground	Voltage
Connector	Connector Terminal		Voltage
E111	1	Ground	Battery voltage

#### Is the inspection result normal?

YES >> GO TO 5.

NO >> GO TO 4.

4.DETECT MALFUNCTIONING PART

Check the following.

Harness connectors E105, M77

10 A fuse (No.4)

Harness for open or short between ASCD clutch switch and fuse

>> Repair open circuit or short to ground or short to power in harness or connectors.

## 5. CHECK ASCD BRAKE SWITCH POWER SUPPLY CIRCUIT-II

- 1. Turn ignition switch OFF.
- 2. Disconnect ASCD brake switch harness connector.
- 3. Check the continuity between ASCD clutch switch harness connector and ASCD brake switch harness connector.

ASCD clutch switch		ASCD bra	Continuity	
Connector	Terminal	Connector Terminal		Continuity
E111	2	E112	. 1	Existed

#### 4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 6.

NO >> Repair open circuit or short to ground or short to power in harness or connectors.

#### **O.CHECK ASCD CLUTCH SWITCH**

Refer to EC-237, "Component Inspection (ASCD Clutch Switch)".

Is the inspection result normal?

YES >> GO TO 9.

NO >> Replace ASCD clutch switch.

7. CHECK ASCD BRAKE SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.

2. Disconnect ECM harness connector.

3. Check the continuity between ASCD brake switch harness connector and ECM harness connector.

ASCD bra	ASCD brake switch		ECM		
Connector	Terminal	Connector	Terminal	· Continuity	
E112	2	E16	100	Existed	

4. Also check harness for short to ground and short to power.

is the inspection result normal?

YES >> GO TO 8.

NO >> Repair open circuit or short to ground or short to power in harness or connectors.

**8.**CHECK ASCD BRAKE SWITCH

Refer to EC-237, "Component Inspection (ASCD Brake Switch)".

Is the inspection result normal?

YES >> GO TO 9.

NO >> Replace ASCD brake switch.

www.digitalkhodro.com

<u> </u>		NOSIS >		
	· .			
Refer to <u>GI</u>	-38, "Interm	ittent Incident".		•
>>		ON END		
Compon	ent Inspe	ction (ASCD	Brake Switch)	INFOID:0000000049
<b>1.</b> снеск	ASCD BRA	KE SWITCH-I		
2. Discon		brake switch har	ness connector. D brake switch terminals under the	e following conditions.
Terminals	(	Condition	Continuity	
		Fully released	Existed	\$
1 and 2	Brake pedal	Slightly depressed	Not existed	
YES >> NO >>	Ction result INSPECTI GO TO 2.	ON END		
		VE OWNED U		
1. Adjust	ction and Ac	ke switch install ljustment"(RHD).		
1. Adjust <u>"Inspec</u> 2. Check Terminals	ASCD braction and Action and Acti	ke switch install l <u>justment"</u> (RHD). ty <mark>b</mark> etween ASCI	D brake switch terminals under the Continuity	
1. Adjust <u>"Inspec</u> 2. Check	ASCD braction and Action and Acti	ke switch install l <u>justment"</u> (RHD). ty between ASCI	D brake switch terminals under the Continuity Existed	
1. Adjust <u>"Inspec</u> 2. Check Terminals 1 and 2 is the inspect YES >> NO >>	ASCD braction and Action and Action and Action the continuit of the contin	ke switch install liustment"(RHD). ty between ASCI Condition Fully released Slightly depressed normal? ON END SCD brake switc	D brake switch terminals under the Continuity Existed Not existed	e following conditions.
1. Adjust "Inspec 2. Check Terminals 1 and 2 Is the inspec YES NO >> Compone	ASCD braction and Action and Action and Action the continuit of the continuity of the conti	ke switch install liustment"(RHD). ty between ASCI Condition Fully released Slightly depressed normal? ON END SCD brake switc	D brake switch terminals under the Continuity Existed Not existed	e following conditions.
1. Adjust <u>"Inspec</u> 2. Check Terminals 1 and 2 is the inspec YES >> NO >> Compone <b>1</b> .CHECK 1. Turn ig 2. Discon	ASCD braction and Action and Action and Action and Action the continuit of the continuition result of the continuition result of the continuet ASCD CLU point of the continuet ASCD club and the continuet ASCD club and the continuet and the continuet ascente ascen	ke switch install liustment"(RHD). ty between ASCI Condition Fully released Slightly depressed Normal? ON END SCD brake switc ction (ASCD TCH SWITCH-I n OFF. clutch switch har	Continuity Existed Not existed h. Clutch Switch)	e following conditions.
1. Adjust <u>"Inspec</u> 2. Check Terminals 1 and 2 is the inspect YES >> NO >> Compone <b>1</b> .CHECK 1. Turn ig 2. Discon	ASCD braction and Action and Action and Action and Action the continuit of the continuition result of the continuition switch and the continuition switch the continuition switch action the continuiti switch action the	ke switch install liustment"(RHD). ty between ASCI Condition Fully released Slightly depressed Normal? ON END SCD brake switc ction (ASCD TCH SWITCH-I n OFF. clutch switch har	Continuity Existed Not existed h. Clutch Switch)	e following conditions.
1. Adjust "Inspec 2. Check Terminals 1 and 2 is the inspec YES >> NO >> Compone 1.CHECK 1. Turn ig 2. Discon 3. Check	ASCD braction and Action and Action and Action and Action the continuit of	ke switch install <u>ijustment"(RHD).</u> ty between ASCI Condition Fully released Slightly depressed normal? ON END SCD brake switc ction (ASCD TCH SWITCH-I n OFF. clutch switch han ty between ASCI Condition Fully released	D brake switch terminals under the Continuity Existed Not existed Not existed Clutch Switch) mess connector. D clutch switch terminals under the	e following conditions.
1. Adjust "Inspec 2. Check Terminals 1 and 2 is the inspec YES >> NO >> Compone 1. CHECK 1. Turn ig 2. Discon 3. Check	ASCD braction and Action and Action and Action and Action the continuit of the continuition result of the continuition switch and the continuition switch the continuition switch action the continuiti switch action the	ke switch install <u>ijustment"(RHD).</u> ty between ASCI Condition Fully released Slightly depressed normal? ON END SCD brake switc ction (ASCD TCH SWITCH-I n OFF. clutch switch han ty between ASCI Condition Fully released	Continuity Existed Not existed Not existed Clutch Switch) Clutch switch terminals under the Continuity Existed	e following conditions.
1. Adjust "Inspec 2. Check Terminals 1 and 2 is the inspec YES >> NO >> Compone 1.CHECK 1. Turn ig 2. Discon 3. Check Terminals 1 and 2	ASCD braction and Action and Action and Action and Action the continuit of	ke switch install iustment"(RHD). ty between ASCI Condition Fully released Slightly depressed normal? ON END SCD brake switc Ction (ASCD TCH SWITCH-I n OFF. clutch switch han ty between ASCI Condition Fully released Slightly depressed	Continuity Existed Not existed Not existed Clutch Switch) Clutch switch terminals under the Continuity Existed	e following conditions.
1. Adjust "Inspec 2. Check Terminals 1 and 2 is the inspec YES >> NO >> COMPON 1. CHECK 1. Turn ig 2. Discon 3. Check Terminals 1 and 2 Is the inspec YES >>	ASCD braction and Action and Action and Action and Action the continuit of	ke switch install iustment"(RHD). ty between ASCI Condition Fully released Slightly depressed normal? ON END SCD brake switc ction (ASCD TCH SWITCH-I n OFF. clutch switch han ty between ASCI Condition Fully released Slightly depressed normal?	Continuity Existed Not existed Not existed Clutch Switch) Clutch switch terminals under the Continuity Existed	e following conditions.

.

Terminals	C	Continuity	
1 and 2	Clutch pedal	Fully released	Existed
1 and 2 C	Ciulcii peuai	Slightly depressed	Not existed

## **ASCD BRAKE SWITCH**

[MR20DE]

#### < COMPONENT DIAGNOSIS >

Is the inspection result normal?

YES

>> INSPECTION END >> Replace ASCD clutch switch. NO

شرکت دیجیتال خودروسامانه (مسئولیت محدود)

4

۲

## www.digitalkhodro.com

	ASCD IN	DICATOR	
COMPONENT DIAG	NOSIS >		[MR20DE]
SCD INDICATO	DR		
escription			INFOID:000000004900035
ET, and is integrated in RUISE lamp illuminate	es when MAIN switch on ASC	·	
CRUISE lamp is illumi SET/COAST switch or	hen following conditions are me		within the range of ASCD
setting. ET lamp remains lit du efer to <u>EC-44, "Systen</u>	ring ASCD control. <u>n Description"</u> for the ASCD fur	nction.	
omponent Function	on Check		INFC/D:000000004900036
ASCD INDICATOR F	UNCTION	· · ·	
	under the following conditions.		<u> </u>
	- 		
ASCD INDICATOR		DITION  • MAIN switch: Pressed at the	SPECIFICATION
CRUISE LAMP	Ignition switch: ON	1st time $\rightarrow$ at the 2nd time	ON → OFF
	MAIN switch: ON     When vehicle speed: Be-	ASCD: Operating	ON
	tween 40 km/h (25 MPH) and		Q
	190 km/h (118 MPH) (For the Middle East), 40 km/h (25	ASCD: Not operating	OFF
	MPH) and 160 km/h (100 MPH) (Except for the Middle East)	شرکت دپ	
the inspection result r			
YES >> INSPECTIC NO >> Go to EC-23	ON ÈND 39. "Diagnosis Procedure".	اومیں ساہ	σ
Piagnosis Procedu	•	ì	INFC/ID:000000004900037
-			IN DID.00000000300007
.CHECK DTC	· · · · · · · · · · · · · · · · · · ·	· · · · · · · · · · · · · · · · · · ·	
heck that DTC U1000	or U1001 is not displayed.		
NO >> GO TO 2.			•
YES >> Perform tro	uble diagnosis for DTC U1000,	U1001. Refer to <u>EC-87, "DT</u>	C Logic".
CHECK COMBINATI	ON METER OPERATION		
efer to MWI-22, "Diagr			
the inspection result r	normal?	· · ·	
YES >> GO TO 3. NO >> Check com <u>System Dia</u>	bination meter circuit. Refer to gram".	MWI-16, "WARNING LAM	IPS/INDICATOR LAMPS :
		•	
CHECK INTERMITT	tent Incident".		<u> </u>

021-62999292

**COOLING FAN** 

## www.digitalkhodro.com

[MR20DE]

INFOID:00000000490003

INFOID 000000000090035

INFOID:0000000004900040

COOLING FAN

Description

COOLING FAN MOTOR Cooling fan operates when the current flows. Refer to <u>EC-52, "System Diagram"</u> for cooling fan operation.

#### Component Function Check

< COMPONENT DIAGNOSIS >

1. CHECK COOLING FAN LOW SPEED FUNCTION

- 1. Start engine and let it idle.
- 2. Turn air conditioner switch and blower fan switch ON.
- 3. Make sure that cooling fan operates at low speed.

#### Is the inspection result normal?

YES >> GO TO 2.

NO >> Check cooling fan low speed control circuit. Refer to EC-240, "Diagnosis Procedure".

2. CHECK COOLING FAN HIGH SPEED FUNCTION

- 1. Turn ignition switch OFF.
- 2. Turn air conditioner switch and blower fan switch OFF.
- 3. Disconnect engine coolant temperature sensor harness connector.
- 4. Connect 150Ω resistor to engine coolant temperature sensor harness connector.
- 5. Restart engine and make sure that cooling fan operates at higher speed than low speed.

Is the inspection result normal?

- YES >> INSPECTION END
- NO >> Check cooling fan high speed control circuit. Refer to EC-240, "Diagnosis Procedure"
- Diagnosis Procedure

1. CHECK COOLING FAN MOTOR GROUND CIRCUIT FOR OPEN AND SHORT

- 1. Turn ignition switch OFF.
- 2. Disconnect cooling fan motor harness connector.
- 3. Check the continuity between cooling fan motor harness connector and ground.

Cooling fa	an motor	Ground	Continuity
Connector Terminal		Circuita	Continuity
E3	2	Ground	Existed

4. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 2.

NO >> Repair open circuit or short to power in harness connectors.

## **2.**CHECK COOLING FAN LOW SPEED CIRCUIT FOR OPEN AND SHORT

- 1. Disconnect IPDM E/R harness connector.
- 2. Check the continuity between IPDM E/R harness connector and cooling fan motor harness connector.

IPDN	/IE/R	Cooling f	Continuity	
Connector	Terminal	Connector	Terminal	Communy
E14	52	E3	1	Existed

3. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 4.

NO >> GO TO 3.

•

СОМРО				COOLING FAN
	NENT D	IAGNOS	SIS >	[MR20DE
DETEC	T MALFI	JNCTION	ING PAR	RT
heck the				· · · ·
Resistor				IDDN: E/D and excline for motor
Harness	tor open	or short	Detween II	PDM E/R and cooling fan motor
_	- Ronair	or replac	o malfunci	ctioning part.
	-	-		EED CIRCUIT-I
Check	the volta	ning tan i nge coolir	elay-s nai no fan rela	rness connector. ay-3 harness connector and ground.
0,,00		.g		
cooling fa	n relay-3			
Connector	Terminal	Ground	Voltage	
<b></b>	1	<u> </u>		
E59	3	Ground	Battery volta	aye
the insp	ection re	sult norm	<u>al?</u>	
	> GO TO			· · · · · · · · · · · · · · · · · · ·
	> GO TO			
.DETEC		JNCTION	NING PAR	
heck the	following	J. 🕘		
				cooling fan relay-3 and battery
	-	•		
	COOLIN	NG FAN I	HIGH SPE	EED CIRCUIT-II
Discor	ستو ت		n an gj	EED CIRCUIT-II
Discor	nnect IPD	DM E/R h	amess coi	
Discor Check	nnect IPD	DM E/R h inuity be	amess co ween coo	nnector.
Discor Check Cooling fa	the cont	DM E/R h inuity be	amess cor ween coo M E/R	onnector. Ding fan relay-3 harness connector and IPDM E/R harness connector.
Check	the cont	DM E/R h inuity be	amess cor ween coo M E/R	onnector. Ding fan relay-3 harness connector and IPDM E/R harness connector.
Check Cooling fa Connector E59	n relay-3 Terminal	DM E/R h inuity be IPD Connecto E13	arness con ween coo M E/R or Terminal 48	Continuity Existed
Check Cooling fa Connector E59	n relay-3 Terminal 4 the cont	DM E/R h inuity be IPD Connecto E13	arness con ween coo M E/R or Terminal 48	onnector. Ding fan relay-3 hamess connector and IPDM E/R harness connector.
Check Cooling fa Connector E59 Check nector	n relay-3 Terminal 4 the cont	DM E/R h inuity be IPD Connecto E13 tinuity be	arness con ween coo M E/R or Terminal 48	Continuity Existed oling fan relay-3 harness connector and IPDM E/R harness connector.
Cooling fa Connector E59 Check	n relay-3 Terminal 4 the cont n relay-3	DM E/R h inuity be IPD Connecto E13 tinuity be	arness cor ween coo M E/R r Terminal 48 tween coc fan motor	Continuity Continuity Continuity Continuity Continuity Continuity Continuity
Cooling fa Coonnector E59 Check nector	n relay-3 Terminal 4 the cont n relay-3	DM E/R h inuity be IPD Connecto E13 tinuity be Cooling	arness cor ween coo M E/R r Terminal 48 tween coc fan motor	Continuity Continuity Continuity Continuity Continuity Continuity Continuity
Check Cooling fa Connector E59 Check nector Cooling fa Coonnector E59	n relay-3 Terminal 4 the cont 4 the cont n relay-3 Terminal 2	DM E/R h inuity be Connecto E13 tinuity be Cooling Connecto E3	arness cor tween coo M E/R or Terminal 48 tween coc fan motor or Terminal 1	Continuity Existed coling fan relay-3 harness connector and IPDM E/R harness connector.
Cooling fa Coonnector E59 Check nector Cooling fa Connector E59 Also C	n relay-3 Terminal 4 the cont 4 the cont 5 n relay-3 Terminal 2 heck har	DM E/R h inuity be Connecto E13 tinuity be Cooling Connecto E3 ness for	arness con ween coo M E/R r Terminal 48 tween coc fan motor or Terminal 1 short to gr	Continuity Continuity Continuity Continuity Continuity Continuity Continuity
Check Cooling fa Connector E59 Check nector Cooling fa Connector E59 Also c s the insp	n relay-3 Terminal 4 the cont 4 the cont 5 n relay-3 Terminal 2 heck har	DM E/R h inuity be Connecto E13 tinuity be Cooling Connecto E3 ness for sult norm	arness con ween coo M E/R r Terminal 48 tween coc fan motor or Terminal 1 short to gr	Continuity Existed coling fan relay-3 harness connector and IPDM E/R harness connector.
Check Cooling fa Connector E59 Check nector Cooling fa Cooling fa Connector E59 Also c the insp YES >	n relay-3 Terminal 4 the cont 4 the cont n relay-3 Terminal 2 heck har ection re	DM E/R h inuity be Connecto E13 tinuity be Cooling Connecto E3 ness for sult norm 9 8.	arness con ween coo M E/R r Terminal 48 tween coc fan motor or Terminal 1 short to gr	Continuity Existed coling fan relay-3 harness connector and IPDM E/R harness connector.
Cooling fa Coonnector E59 Check nector Cooling fa Connector E59 Also C the insp YES > NO >	n relay-3 Terminal 4 the cont 4 the cont 5 the cont 5 the cont 5 the cont 2 heck har ection re > GO TC > GO TC	DM E/R h inuity be Connecto E13 tinuity be Cooling Connecto E3 ness for s sult norm 9 8. 9 7.	arness con ween coo M E/R r Terminal 48 tween coc fan motor or Terminal 1 short to gr	Continuity Existed coling fan relay-3 harness connector and IPDM E/R harness connector.
Cooling fa Coonnector E59 Check nector Cooling fa Connector E59 Also C the insp YES > NO >	n relay-3 Terminal 4 the cont 4 the cont 5 the cont 5 the cont 5 the cont 6 the cont 5 the cont 6 the cont 6 the cont 6 the cont 7 the cont 7 the cont 8 the cont 9 the cont 1 the cont 1 t	DM E/R h inuity be Connecto E13 tinuity be Cooling Connecto E3 ness for Sult norm 9 8. 9 7. UNCTIOI	amess contween coo M E/R r Terminal 48 tween coo fan motor or Terminal 1 short to group al?	Continuity Existed coling fan relay-3 harness connector and IPDM E/R harness connector.
Cooling fa Cooling fa Connector E59 Check nector Cooling fa Connector E59 Also C the insp YES > NO > DETEC heck the Harness	n relay-3 Terminal 4 the cont 4 the cont 5 the cont 5 the cont 5 the cont 5 the cont 2 the cont 5 the cont 2 the cont 2 the cont 2 the cont 2 the cont 5 the cont 2 the cont 5 the cont 5 t	DM E/R h inuity be Connecto E13 tinuity be Cooling Connecto E3 ness for Sult norm 9 8. 9 7. UNCTIOI	Arriess continued of the second of the secon	Continuity Existed coling fan relay-3 harness connector and IPDM E/R harness connector.
Cooling fa Cooling fa Connector E59 Check nector Cooling fa Connector E59 Also C the insp YES > NO > DETEC heck the Harness	n relay-3 Terminal 4 the cont 4 the cont 5 the cont 5 the cont 5 the cont 5 the cont 2 the cont 5 the cont 2 the cont 2 the cont 2 the cont 2 the cont 5 the cont 2 the cont 5 the cont 5 t	DM E/R h inuity be Connecto E13 tinuity be Cooling Connecto E3 ness for Sult norm 9 8. 9 7. UNCTIOI	Arriess continued of the second of the secon	Continuity Existed coling fan relay-3 harness connector and IPDM E/R harness connector.
Check Cooling fa Connector E59 Cooling fa Connector E59 Also C the insp YES > NO > DETEC heck the Harness Harness	n relay-3 Terminal 4 the cont 4 the cont 5 the cont 5 the cont 5 the cont 5 the cont 5 the cont 5 the cont 5 the cont 6 the cont 5 the cont 5 the cont 6 the cont 5 the cont 6 the cont 5 the cont 6 the cont 5 the cont 6 the cont 6 the cont 7 the cont 1 the cont 1 the cont 1 the cont 1 the cont 1 t	DM E/R h inuity be Connecto E13 tinuity be Cooling Connecto E3 ness for Sult norm 9 8. 9 7. UNCTIOI 9 8. 9 7. UNCTIOI	Armess continuent of the second of the secon	Continuity Existed coling fan relay-3 harness connector and IPDM E/R harness connector.
Check Cooling fa Connector E59 Check nector Cooling fa Connector E59 Also c s the insp YES > NO > DETEC heck the Harness Harness	n relay-3 Terminal 4 the cont 4 the cont 5 the cont 5 the cont 5 the cont 2 heck har ection re > GO TC > GO TC 5 GO TC	DM E/R h inuity be Connecto E13 tinuity be Cooling Connecto E3 ness for Sult norm 9 8. 9 7. UNCTIOI 0 short or short or short	Armess continued of the second	Continuity Existed coling fan relay-3 harness connector and IPDM E/R harness connector.
Check Cooling fa Connector E59 Check nector Cooling fa Connector E59 Also c s the insp YES > NO > DETEC heck the Harness Harness	n relay-3 Terminal 4 the cont 4 the cont 5 the cont 5 the cont 5 the cont 2 heck har ection re > GO TC > GO TC 5 GO TC	DM E/R h inuity be Connecto E13 tinuity be Cooling Connecto E3 ness for Sult norm 9 8. 9 7. UNCTIOI 0 short or short or short	Armess continuent of the second of the secon	Continuity Existed coling fan relay-3 harness connector and IPDM E/R harness connector.
Check Cooling fa Connector E59 Check nector Cooling fa Connector E59 Also c the insp YES > NO > DETEC heck the Harness Harness	n relay-3 Terminal 4 the cont 4 the cont 4 the cont 5 theck har ection re > GO TC 5 GO	DM E/R h inuity be Connecto E13 tinuity be Cooling Connecto E3 ness for Sult norm 9 8. 9 7. UNCTIOI 0 8. 9 7. UNCTIOI 0 short or short or short open circ	Armess continuents continuent coordinates	Continuity Existed coling fan relay-3 harness connector and IPDM E/R harness connector.

`• `\

,

COMPON	IENT DIAGNOSIS >	COOLING FAN	[MR20DE]
	ttion result normal?		
	GO TO 9.		
	Replace cooling fan rela	ıy-3.	
Э.снеск	COOLING FAN MOTOR	-	
Refer to EC	242, "Component Inspe	ction (Cooling Fan Motor)".	· · · · · · · · · · · · · · · · · · ·
	tion result normal?		
	GO TO 10.		
	Replace cooling fan mot		
10.CHEC		DENT	
Perform GI-	38, "Intermittent Incident		, <u></u>
-	tion result normal?		
	Replace IPDM E/R.	·	
	Repair or replace harne		
Jompone	ent Inspection (Coo	ling Fan Motor)	INFCID:000000004900041
1.CHECK	COOLING FAN MOTOR		· · ·
	ition switch OFF.	— <u> </u>	
2. Disconr	ect cooling fan motor ha	arness connector.	
3. Supply	cooling fan motor termin	al with battery voltage and check	coperation.
Terminals		+ i i = = = = =	
	-) Operation		
	2 Cooling fan operates		
	ction result normal?	_	
1000	INSPECTION END	شركت ديحيتال خودرو	
	Replace cooling fan mo	tor.	
Compone	ent Inspection (Coo	ling Fan Relay) wowig	INFOID:000000004900042
1.CHECK	COOLING FAN RELAY-	3	
	ition switch OFF.		
2. Remove 3. Check	e cooling fan relay-3.	engling for volume 0 to main the	· · · · · · · · · · · · · · · · · · ·
under th	ne following conditions.	cooling fan relay-3 terminals	
Terminals	Conditio	ons Continuity	
1 and 2	12V direct current supply be	tween terminals 3 and 4 Existed	
	No current supply	Not existed	
s the inspe	ction result normal?	···	
YES >>	INSPECTION END		
	Replace cooling fan rela	ау-З.	JMBIA045222
	- -		JUC 45222
	- -	· · · · ·	JMDI4045222
		· · · · · ·	

021-62999292

## ......

www.digitalkhodro.com

ELECTRICAL LOAD SIGNAL		
< COMPONENT DIAGNOSIS >	[MR20DE]	
ELECTRICAL LOAD SIGNAL		
Description	INFOID:000000004900043	A
The electrical load signal (Headlamp switch signal, rear window defogger switch signal, etc.) through the CAN communication line.	is transferred	EC
Diagnosis Procedure	INFOID:000000004900045	~
1.INSPECTION START		С
Confirm the malfunctioning circuit (rear window defogger, headlamp or heater fan). Which circuit is related to the incident?		D
Rear window defogger>>GO TO 2 Headlamp>>GO TO 3. Heater fan>>GO TO 4.		E
2.CHECK REAR WINDOW DEFOGGER SYSTEM		
Refer to DEF-2, "System Diagram".	<u></u>	F
>> INSPECTION END		• •
3.CHECK HEADLAMP SYSTEM		G
Refer to EXL-6, "System Diagram" (XENON TYPE) or EXL-123, "System Diagram" (HALOGEN	TYPE).	
>> INSPECTION END		Н
4. CHECK HEATER FAN CONTROL SYSTEM		
Refer to HAC-4, "Work Flow" (AUTOMATIC A/C) or HAC-123. "Work Flow" (MANUAL A/C).		I
سردت دیجیتال خودرو سامانه (مستولیت محد		
>> INSPECTION END		J
		К
	·	L
<b>9</b> ●		М
		Ν
		0
		Ρ

021-62999292

ą.

FUEL INJECTOR

#### < COMPONENT DIAGNOSIS >

#### **FUEL INJECTOR**

#### Description

The fuel injector is a small, precise solenoid valve. When the ECM supplies a ground to the fuel injector circuit, the coil in the fuel injector is energized. The energized coil pulls the ball valve back and allows fuel to flow through the fuel injector into the intake manifold. The amount of fuel injected depends upon the injection pulse duration. Pulse duration is the length of time the fuel injector remains open. The ECM controls the injection pulse duration based on engine fuel needs.



## **Component Function Check**

**1.**INSPECTION START

Turn ignition switch to START.

Is any cylinder ignited?

YES >> GO TO 2.

NO >> Go to EC-244; "Diagnosis Procedure".

2. CHECK FUEL INJECTOR FUNCTION

1. Let engine idle.

2. Listen to each fuel injector operating sound.

#### Clicking noise should be heard.

Is the inspection result normal?

YES >> INSPECTION END

NO >> Go to EC-244. "Diagnosis Procedure".



#### Diagnosis Procedure

## 1. CHECK FUEL INJECTOR POWER SUPPLY CIRCUIT

- 1. Turn ignition switch OFF.
- 2. Disconnect fuel injector harness connector.
- 3. Turn ignition switch ON.
- 4. Check the voltage between fuel injector harness connector and ground.

	Fuel injecto	Ground	Voltago		
Cylinder	Connector	Terminal	Giouna	Voltage	
1	F37	1			
2	F38	1	Crowned	Democratic	
3	F39	1	Ground	Battery voltage	
4	F40	1			

#### Is the inspection result normal?

YES >> GO TO 3.

NO i >> GO TO 2.

### 021-62999292

www.digitalkhodro.com

[MR20DE]

INFOID:000000004990046

INFOID:000000004900047

## **FUEL INJECTOR**

www.digitalkhodro.com

[MR20DE] < COMPONENT DIAGNOSIS > 2. DETECT MALFUNCTIONING PART А Check the following. Harness connectors F123, E6 10A fuse (No. 58) EC Harness for open or short between fuel injector and fuse >> Repair open circuit or short to ground or short to power in harness or connectors. С  ${f 3.}$  CHECK FUEL INJECTOR OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT Turn ignition switch OFF. 1. D Disconnect ECM harness connector. 2. Check the continuity between fuel injector harness connector and ECM harness connector. 3. Ε ECM Fuel injector Continuity Terminal Cylinder Connector Terminal Connector F37 2 31 1 F F38 2 30 2 F7 Existed 2 29 3 F39 F40 2 25 G 4 Also check harness for short to ground and short to power. Is the inspection result normal? Н YES >> GO TO 4. NO >> Repair open circuit or short to ground or short to power in harness or connectors. 4. CHECK FUEL INJECTOR Refer to EC-245. "Component Inspection". is the inspection result normal? >> GO TO 5. YES NO >> Replace malfunctioning fuel injector. 5. CHECK INTERMITTENT INCIDENT к Refer to GI-38. "Intermittent Incident". Is the inspection result normal? YES >> Replace IPDM E/R. L NO >> Repair or replace harness or connectors. Component Inspection INFOID:000000004900049 М **1.**CHECK FUEL INJECTOR 1. Turn ignition switch OFF. Ν 2. Disconnect fuel injector harness connector. 3. Check resistance between fuel injector terminals as follows. 0 Resistance Terminals 1 and 2 11.1 - 14.5Ω [at 10 - 60°C (50 - 140°F)] Is the inspection result normal? р YES >> INSPECTION END

NO >> Replace malfunctioning fuel injector.

FUEL PUMP

www.digitalkhodro.com

[MR20DE]

#### < COMPONENT DIAGNOSIS >

## FUEL PUMP

Description

INFOID:000000004900050

Sensor	Input signal to ECM	ECM Function	Actuator	
Crankshaft position sensor (POS) Camshaft position sensor (PHASE)	Engine speed*	Fuel pump control	Fuel pump relay ↓ Fuel pump	
Battery	Battery voltage*			

\*: ECM determines the start signal status by the signals of engine speed and battery voltage.

The ECM activates the fuel pump for several seconds after the ignition switch is turned ON to improve engine startability. If the ECM receives a engine speed signal from the camshaft position sensor (PHASE), it knows that the engine is rotating, and causes the pump to operate. If the engine speed signal is not received when the ignition switch is ON, the engine stalls. The ECM stops pump operation and prevents battery discharging, thereby improving safety. The ECM does not directly drive the fuel pump. It controls the ON/OFF fuel pump relay, which in turn controls the fuel pump.

Condition	Fuel pump operation		
Ignition switch is turned to ON	Operates for 1 second		
Engine running and cranking	Operates		
When engine is stopped	Stops in 1.5 seconds		
Except as shown above	Stops		

#### Component Function Check

INFCID:000000004900051

#### **1.**CHECK FUEL PUMP FUNCTION

- 1. Turn ignition switch ON.
- 2. Pinch fuel feed hose with two fingers.

## Fuel pressure pulsation should be felt on the fuel feed hose for 1 second after ignition switch is turned ON.

#### Is the inspection result normal?

- YES >> INSPECTION END
- NO >> EC-246, "Diagnosis Procedure".



### **Diagnosis Procedure**

## 1. CHECK FUEL PUMP POWER SUPPLY CIRCUIT-I

- 1. Turn ignition switch OFF.
- 2. Disconnect ECM harness connector.
- 3. Turn ignition switch ON.
- 4. Check the voltage between ECM harness connector and ground.

EC	M	Ground	Voltage	
Connector	Connector Terminal		vonage	
F7	23	Ground	Battery voltage	

is the inspection result normal?

YES >> GO TO 4.

NO >> GO TO 2.

2. CHECK FUEL PUMP POWER SUPPLY CIRCUIT-II

#### 021-62999292

INFOID:00000000490005:

## www.digitalkhodro.com

digitalkho	Jaro.cor	n		FUEL	PUMP	www.digitalkhodro.d
< COMPO	NENT DI/	AGNOSIS	>			[MR20DE]
1. Turn ig 2. Discon	nition swit	ch OFF. /I E/R harn	ess connec		connector and ECM	hamess connector.
EC	:M İ	IPDI	/IE/R			
Connector	Terminal	Connector	Terminal	Continuity	,	
F7	23	E13	33	Existed		
1. Also ch	neck harne	ess for sho	rt to ground	and short t	o power.	
<u>s the inspe</u>	ection resu	<u>ult normal?</u>				
	- GO TO 1					
_	SOTO 3					•
		NCTIONIN				
Check the f		tors E6, F1	102			
				E/R and E	СМ	
		,				
>>	> Repair h	arness or o	connectors.			
	•			CIRCUIT-I	II	
L. Turn ig	inition swit	ch OFF				
			nectors disc	connected.		
					harness connector.	
	nition swil		or anne arna	idei pamp i		
6. Check	voltage b	etween "fu	el level sen	sor unit and	fuel pump" harnes	s connector and ground.
	, on a go o			• •	•••	
Fuel level se	ensor unit an	d fuel pump				
Connec	tor	Terminal	Ground	Volta	ige o cuojuu	
B40	ن خودر	بيركارار		attery voltage econd after igr turn (	hition switch is	
s the inspe	ection resu	ult normal?				
	> GO TO 8				. '	
-	> GO TO 5					
D.CHECK	15A FUS	E ·				
I. Turn ig	nition swit	tch OFF.			·····	· · · · · · · · · · · · · · · · · · ·
			57) from IPE	DM E/R.	• .	
•	15A fuse.					
		<u>ult normal?</u>				
	> GO TO 6					
<b>^</b>	> Replace					
J.CHECK	FUEL PU		-R SUPPLY	CIRCUIT-I	v	
2. Check	the continues connect	nuity betwo	ess connec een IPDM I	stor. E/R harness	s connector and "fu	el level sensor unit and fuel pump"
IPDM	IE/R	1	ensorunit and I pump	Continuity		
Connector	Terminal	Connector	1	-		
E13	42	B40	1	Existed	·	
	-+4	<u> </u>	<u> </u>	LAISIEU		

3. Also check harness for short to ground and short to power. Is the inspection result normal? www.digitalkhodro.com

FUEL PUMP

www.digitalkhodro.com

< COMPONENT DIAGNOSIS >

[MR20DE]

YES >> GO TO 10. NO >> GO TO 7.

7.DETECT MALFUNCTIONING PART

Check the following.

Harness connectors B11, E101

Harness for open or short between IPDM E/R and "fuel level sensor unit and fuel pump"

>> Repair open circuit or short to ground or short to power in harness or connectors.

## 8. CHECK FUEL PUMP GROUND CIRCUIT

1. Turn ignition switch OFF.

2. Check the continuity between "fuel level sensor unit and fuel pump" and ground.

Fuel level sensor u	Ground	Continuity		
Connector	Connector Terminal			
B40	3	Ground	Existed	

Also heck harness for short to power.

Is the inspection result normal?

YES >> GO TO 9.

NO >> Repair open circuit or short to power in harness or connectors.

9.CHECK FUEL PUMP

Refer to EC-248, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 10.

NO >> Replace fuel pump.

**10.**CHECK INTERMITTENT INCIDENT

Refer to GI-38, "Intermittent Incident".

#### Is the inspection result normal?

YES >> Replace IPDM E/R.

NO >> Repair or replace harness or connectors.

#### **Component Inspection**

**1.**CHECK FUEL PUMP

1. Turn ignition switch OFF.

- 2. Disconnect "fuel level sensor unit and fuel pump" harness connector.
- 3. Check resistance between "fuel level sensor unit and fuel pump" terminals as follows.

Terminals	Resistance					
3 and 5	0.2 - 5.0Ω [at 25°C (77°F)]					
Is the inspection result normal?						

YES >> INSPECTION END

NO >> Replace "fuel level sensor unit and fuel pump".

INFOID:000000004900053

m

digitalkh	odro.cc	om	14		digitalkhodro.co
< COMPC		IAGNOS		GINNEN SIGNAL	[MR20DE]
IGNITIC					
			•		A
Descript	lon				INFOID:000000004900054
The ignition ON and O secondary	FF the igr	rom the E hition coil	ECM is sent to primary circuit.	and amplified by the power transistor. The power This ON/OFF operation induces the proper high vo	transistor turns Itage in the coil
Compor	ent Fur	nction C	heck		* INFOID:000000004900055 C
1.INSPE		TART			
•		-	restart engine		D
Does the e YES >	<u>engine sta</u> > GO TO				
			Diagnosis Proc	edure".	E
2.IGNITIC	ON SIGN	AL FUNC	TION		
	igine idle. the voltag		between ECM	harness connector terminals with an oscilloscope.	F
		ECM			G
	<u> </u>		-	Vottage signal	G
Connector	Terminal	Connecto	or Terminal		н
	18				
F7	21	E16	108		
ت محد	سئولي	بانة (م	نودروساه		
	22				J
NOTE:	بخودر	ركارارا	يلمعتىالتيل	JMBIA0329GB	
	ise cycle ch	anges depe	nding on rpm at id	ile.	к
Is the insp	ection res	sult norma	<u>1?</u>		IX IX
	> INSPE(		ND Diagnosis Proc	edure"	
Diagnos			<u>/////////////////////////////////////</u>	<u>endre</u> .	
					INFOID:0000000004900056
1.CHECH	( IGNITIC	IN COIL F	POWER SUPP		M
				0 seconds and then turn ON. ss connector and ground.	N
	ECM				
	+	-	Voltage	· · · · · · · · · · · · · · · · · · ·	~
Connector	Terminal	Terminal			0
E16	105	108	Battery voltage		
Is the insp			<u>al?</u>		P
YES >	> GO TO	2.			

- NO >> Go to EC-84, "Diagnosis Procedure".
- 2. CHECK IGNITION COIL POWER SUPPLY CIRCUIT-II
- Turn ignition switch OFF. 1.
- 2. Disconnect condenser harness connector.
- 3. Turn ignition switch ON.

## **IGNITION SIGNAL**

## www.digitalkhodro.com

#### < COMPONENT DIAGNOSIS >

[MR20DE]

4. Check the voltage between condenser harness connector and ground.

Cond	enser	Ground	Voltage	
Connector	Terminal	Circuna		
F13	1	Ground	Battery voltage	

Is the inspection result normal?

YES >> GO TO 5.

NO >> GO TO 3.

## 3. CHECK IGNITION COIL POWER SUPPLY CIRCUIT-III

- 1. Turn ignition switch OFF.
- 2. Disconnect IPDM E/R harness connector.
- 3. Check the continuity between IPDM E/R harness connector and condenser harness connector.

IPDM E/R		Condenser		Continuity
Connector	Terminal	Connector	Terminal	Communy
E11	10	F13	1	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 11. NO >> GO TO 4.

4.DETECT MALFUNCTIONING PART

#### Check the following.

- Harness connectors E7, F121
- Harness for open or short between IPDM E/R and condenser

>> Repair open circuit or short to ground or short to power in harness or connectors.

#### 5. CHECK CONDENSER GROUND CIRCUIT FOR OPEN AND SHORT

- 1. Turn ignition switch OFF.
- 2. Check the continuity between condenser harness connector and ground.

Cond	denser	Ground	Continuitu	
Connector	Terminal		Continuity	
F13	2	Ground	Existed	

3. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 6.

NO >> Repair open circuit or short to ground or short to power in harness or connectors.

**O.**CHECK CONDENSER

Refer to EC-252, "Component Inspection (Condenser)"

Is the inspection result normal?

YES >> GO TO 7.

NG >> Replace condenser.

## 7. CHECK IGNITION COIL POWER SUPPLY CIRCUIT-V

1. Reconnect all harness connectors disconnected.

2. Disconnect ignition coil harness connector.

3. Turn ignition switch ON.

4. Check the voltage between ignition coil harness connector and ground.

021-62999292

## **IGNITION SIGNAL**

## www.digitalkhodro.com

[MR20DE]

А

EC

С

D

Е

F

G

Н

Κ

M

Ν

0

P

## < COMPONENT DIAGNOSIS >

Ignition coil		Ground	Voltage	
Cylinder	Connector	Terminal		voltage
1	F33	3	Ground	
2	F34	3		Battery voltage
3	F35	3		Dattery voltage
4	F36	3		

Is the inspection result normal?

YES >> GO TO 8.

NO >> Repair open circuit or short to ground or short to power in harness or connectors.

 ${f 8}.$  CHECK IGNITION COIL GROUND CIRCUIT FOR OPEN AND SHORT

#### 1. Turn ignition switch OFF.

2. Check the continuity between ignition coil harness connector and ground.

Ignition coil			Ground	Continuity
Cylinder	Connector	Terminal	Ground	Continuity
1	F33	2	Ì	
2	F34	2	Ground	Existed
3	F35	2	Ground	Existed
4	F36	2		

3. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 9.

NO >> Repair open circuit or short to power in harness or connectors.

9. CHECK IGNITION COIL OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.

2. Check the continuity between ECM harness connector and ignition coil harness connector.

Ignition coil			ECM		Continuity
Cylinder	Connector	Terminal	Connector	Terminal	Continuity
1	F33	1		17 .	
2	F34	1	F7	18	Existed
3	F35	1		22	Existed
4	F36	1		21	

3. Also check harness for short to ground and short to power.

#### Is the inspection result normal?

YES >> GO TO 10.

NO >> Repair open circuit or short to ground or short to power in harness or connectors.

### **10.**CHECK IGNITION COIL WITH POWER TRANSISTOR

Refer to EC-252, "Component Inspection (Ignition Coil with Power Transistor)".

Is the inspection result normal?

YES >> GO TO 11.

NO >> Replace malfunctioning ignition coil with power transistor.

11. CHECK INTERMITTENT INCIDENT

Refer to GI-38, "Intermittent Incident".

>> INSPECTION END

## **IGNITION SIGNAL**

#### < COMPONENT DIAGNOSIS >

## Component Inspection (Ignition Coil with Power Transistor)

## 1. CHECK IGNITION COL WITH POWER TRANSISTOR-I

- 1. Turn ignition switch OFF.
- 2. Disconnect ignition coil harness connector.
- 3. Check resistance between ignition coil terminals as follows.

Terminals	Resistance	
1 and 2	Except 0 or $\infty \Omega$ [at 25°C (77°F)]	
1 and 3	Except 0 Ω [at 25°C (77°F)]	
2 and 3		

Is the inspection result normal?

YES >> GO TO 2.

NO >> Replace malfunctioning ignition coil with power transistor.

## 2. CHECK IGNITION COIL WITH POWER TRANSISTOR-II

#### CAUTION:

#### Do the following procedure in the place where ventilation is good without the combustible.

- 1. Turn ignition switch OFF.
- 2. Reconnect all harness connectors disconnected.
- 3. Remove fuel pump fuse in IPDM E/R to release fuel pressure.
- 4. Start engine.
- 5. After engine stalls, crank it two or three times to release all fuel pressure.
- 6. Turn ignition switch OFF.
- 7. Remove all ignition coil harness connectors to avoid the electrical discharge from the ignition coils.
- 8. Remove ignition coil and spark plug of the cylinder to be checked.
- 9. Crank engine for 5 seconds or more to remove combustion gas in the cylinder.
- 10. Connect spark plug and harness connector to ignition coil.
- 11. Fix ignition coil using a rope etc. with gap of 13 17 mm (0.52 0.66 in) between the edge of the spark plug and grounded metal portion as shown in the figure.
- 12. Crank engine for about three seconds, and check whether spark is generated between the spark plug and the grounded metal portion.

Spark should be generated.

#### CAUTION:

• Do not approach to the spark plug and the ignition coil within 50 cm (19.7 in). Be careful not to get an electrical shock while checking, because the electrical discharge voltage becomes 20kV or more.

• It might cause to damage the ignition coil if the gap of more than 17 mm 0.66 in) is taken. NOTE:

When the gap is less than 13 mm (0.52 in), the spark might be generated even if the coil is malfunctioning.

Is the inspection result normal?

- YES >> INSPECTION END
- NO >> Replace malfunctioning ignition coil with power transistor.

### Component Inspection (Condenser)

## **1.**CHECK CONDENSER

- 1. Turn ignition switch OFF.
- 2. Disconnect condenser harness connector.
- 3. Check resistance between condenser terminals as follows.



INFOID:000000004900058

[MR20DE]

INFOID:000000004900057
[MR20DE]

А

EC

С

D

Е

F

## < COMPONENT DIAGNOSIS >

Terminals	Resistance					
1 and 2	Above 1 MΩ [at 25°C (77°F)]					
Is the insp	ection result normal?					
· – -	>> INSPECTION END >> Replace condenser.					



شرکت دیجیتال خودرو سامانه (مسئولیت محدود

# اولین سامانه دیجیتال تعمیر کاران خودرو در ایران

.

. . . .

.

ł

G

N

O

.

# MALFUNCTION INDICATOR LAMP

### < COMPONENT DIAGNOSIS >

# MALFUNCTION INDICATOR LAMP

### Description

The Malfunction Indicator (MIL) is located on the combination meter. The MIL will light up when the ignition switch is turned ON without the engine running. This is a bulb check.

When the engine is started, the MIL should go off. If the MIL remains on, the on board diagnostic system has detected an engine system malfunction.

For details, refer to EC-254, "Diagnosis Procedure".



### **Component Function Check**

**1.**CHECK MIL FUNCTION

1. Turn ignition switch ON.

2. Make sure that MIL lights up.

Is the inspection result normal?

YES >> INSPECTION END

NO >> Go to EC-254, "Diagnosis Procedure"

**Diagnosis** Procedure

**1.**CHECK DTC

Check that DTC U1000 or U1001 is not displayed.

Is DTC detected?

NO >> GO TO 2.

YES >> Perform trouble diagnosis for DTC U1000, U1001. Refer to EC-87, "Diagnosis Procedure".

2. CHECK DTC WITH COMBINATION METER

Refer to MWI-3, "METER SYSTEM : System Diagram".

Is DTC detected?

NO >> GO TO 3.

YES >> Perform trouble shooting relevant to DTC indicated.

**3.**CHECK INTERMITTENT INCIDENT

Refer to GI-38, "Intermittent Incident".

### Is the inspection result normal?

YES >> Replace combination meter.

NO >> Repair or replace.

# [MR20DE]

INFOID-000000004900055

INFOID 000000004900060

INFOID.00000000490006



# POSITIVE CRANKCASE VENTILATION

### < COMPONENT DIAGNOSIS >

# POSITIVE CRANKCASE VENTILATION

# Description



This system returns blow-by gas to the intake manifold.

The positive crankcase ventilation (PCV) valve is provided to conduct crankcase blow-by gas to the intake manifold.

During partial throttle operation of the engine, the intake manifold sucks the blow-by gas through the PCV valve.

Normally, the capacity of the valve is sufficient to handle any blow-by and a small amount of ventilating air. The ventilating air is then drawn from the air inlet tubes into the crankcase. In this process the air passes through the hose connecting air inlet tubes to rocker cover.

Under full-throttle condition, the manifold vacuum is insufficient to draw the blow-by flow through the valve. The flow goes through the hose connection in the reverse direction.

On vehicles with an excessively high blow-by, the valve does not meet the requirement. This is because some of the flow will go through the hose connection to the air inlet tubes under all conditions.



### **Component Inspection**

### **1.**CHECK PCV VALVE

With engine running at idle, remove PCV valve from rocker cover. A properly working valve makes a hissing noise as air passes through it. A strong vacuum should be felt immediately when a finger is placed over valve inlet.

### Is the inspection result normal?

YES	>> INSPECTION END
NO	>> Replace PCV valve.



### [MR20DE]

INFOID:000000004900062

www.digitalkhodro.com

А

EC

С

D

Е

F

G

Н

N

INFOID:000000004900083

# REFRIGERANT PRESSURE SENSOR

### < COMPONENT DIAGNOSIS >

# REFRIGERANT PRESSURE SENSOR

### Description

INFOID.000000004900054

The refrigerant pressure sensor is installed at the condenser of the air conditioner system. The sensor uses an electrostatic volume pressure transducer to convert refrigerant pressure to voltage. The voltage signal is sent to ECM, and ECM controls cooling fan system.



### **Component Function Check**

INFOID:000000004900065

### **1.**CHECK REFRIGERANT PRESSURE SENSOR OVERALL FUNCTION

- 1. Start engine and warm it up to normal operating temperature.
- 2. Turn A/C switch and blower fan switch ON.
- 3. Check the voltage between ECM harness connector terminals.

	ECM	8		
Connector	+	-	Voltage	
Connector	Terminal Terminal	Terminal		
F8	41 (Refrigerant pressure sensor signal)	48	1.0 - 4.0V	

### Is the inspection result normal?

- YES >> INSPECTION END
- NO >> Go to EC-256, "Diagnosis Procedure".

### Diagnosis Procedure

INFOID;000000004900065

### **1.**CHECK GROUND CONNECTION

- 1. Turn A/C switch and blower fan switch OFF.
- 2. Stop engine and turn ignition switch OFF.
- 3. Check ground connection E21 and E38. Refer to Ground Inspection in GI-40, "Circuit Inspection".

### Is the inspection result normal?

- YES >> GO TO 2.
- NO >> Repair or replace ground connection.

### 2. CHECK REFRIGERANT PRESSURE SENSOR POWER SUPPLY CIRCUIT

- 1. Disconnect refrigerant pressure sensor harness connector.
- 2. Turn ignition switch ON.
- 3. Check the voltage between refrigerant pressure sensor harness connector and ground.

Refrigerant pre	ssure sensor	Ground	Voltage
Connector	Terminal	around	Volage
E49	3	Ground	Approx. 5V

Is the inspection result normal?

YES >> GO TO 4.

NO >> GO TO 3.

### 021-62999292

### EC-256

### 021-62999292

www.digitalkhodro.com

### [MR20DE]

·

www.digitalkhodro.com

				NT PRESSURE SENSO	[MR20DE]
B.DETECT N	MALFUNCT		ART	•	
Check the fol Harness co		6 E123			
			n ECM an	d refrigerant pressure sensor	
				· .	
			-	und or short to power in harness	
			SURE SE	ISOR GROUND CIRCUIT FOR	
	tion switch ( ect ECM hai		ector		
3. Check th	e continuity	/ between i	refrigerant	pressure sensor harness conne	ctor and ECM harness connec-
tor.					
Refrigerant pre	ssure sensor	EC	CM <sup>.</sup>	·	
Connector	Terminal	Connector	Terminal	Continuity	
E49	1	F8	48	Existed	
4. Also che	ck harness	for short to	ground a	nd short to power.	
Is the inspect		ormal?			1
	30 TO 6. 30 TO 5.				
5.DETECT			ART		
Check the fol					
Harness co	nnectors E6				
<ul> <li>Harness for</li> </ul>	r o <mark>p</mark> en or sh	ort betwee	n ECM an	d refrigerant pressure sensor	
	Repair open	circuit or s	bort to arr	ound or short to power in harness	or connectors.
•			// / <del>-</del>	ISOR INPUT SIGNAL CIRCUIT	
				pressure sensor hamess conne	
tor.	-,,-,,				
				· · ·	
Refrigerant pre	Terminal	Connector	CM Terminal	Continuity	
E49	2	F8	41	Existed	· · ·
	_		71		•
Is the inspect			ground a	nd short to power.	•
	<u>tion result n</u>	<u>ormai?</u>	ground a	nd short to power.	
YES >> 0	GO TO 8.	iormal?	ground a	nd short to power.	
YES >> 0 NO >> 0	30 TO 8. 30 TO 7.			nd short to power.	
YES >> 0 NO >> 0 7.DETECT I	GO TO 8. GO TO 7. MALFUNCT			nd short to power.	•
YES >> 0 NO >> 0 7.DETECT I	GO TO 8. GO TO 7. MALFÚNCT Ilowing.			nd short to power.	• -
YES >> 0 NO >> 0 7.DETECT I Check the fol • Harness co	GO TO 8. GO TO 7. MALFÚNCT Ilowing. onnectors E6	TIONING P. 6, F123	ART	d refrigerant pressure sensor	· ·
YES >> 0 NO >> 0 7.DETECT I Check the fol • Harness co	GO TO 8. GO TO 7. MALFÚNCT Ilowing. onnectors E6	TIONING P. 6, F123	ART		•
YES >> 0 NO >> 0 7.DETECT I Check the fol • Harness co • Harness for	GO TO 8. GO TO 7. MALFÚNCT Ilowing. onnectors E6 r open or sh	FIONING P. 6, F123 hort betwee	ART n ECM ar		or connectors.
YES >> 0 NO >> 0 7.DETECT I Check the fol • Harness co • Harness for	GO TO 8. GO TO 7. MALFUNCT Ilowing. onnectors E6 r open or sh Repair open	FIONING P. 6, F123 hort betwee h circuit or s	ART In ECM ar	d refrigerant pressure sensor	or connectors.
YES >> C NO >> C 7.DETECT I Check the fol • Harness co • Harness for >> F	GO TO 8. GO TO 7. MALFÚNCT Ilowing. onnectors E6 r open or sh Repair open NTERMITTE	FIONING P 6, F123 hort betwee h circuit or s ENT INCID	ART In ECM ar short to gro ENT	d refrigerant pressure sensor	or connectors.
YES >> 0 NO >> 0 7.DETECT I Check the fol Harness co Harness for >> F 8.CHECK IN	GO TO 8. GO TO 7. MALFÚNCT Ilowing. Innectors E6 r open or sh Repair open NTERMITTE	TIONING P. 6, F123 hort betwee h circuit or s ENT INCID	ART In ECM ar short to gro ENT	d refrigerant pressure sensor	or connectors.

>> Replace refrigerant pr >> Repair or replace. NO

١

Ņ

# [MR20DE] < ECU DIAGNOSIS > **ECU DIAGNOSIS**

# **ECM**

**Reference Value** 

INFOID:000000004900067

### **TERMINAL LAYOUT**



### PHYSICAL VALUES

### NOTE:

- ECM is located in the engine room left side near battery.
- When disconnecting ECM harness connector (A), loosen (C) it with levers as far as they will go as shown in the figure.
  - 1 : ECM
  - B : Fasten
- Connect a break-out box [SST (EG17550000)] and harness adapter [SST (EG17680000)] between the ECM and ECM harness connector.
- Use extreme care not to touch 2 pins at one time.
- Data is for comparison and may not be exact.
- Specification data are reference values and are measured between each terminals.



	nal No. color)	Description		Condition	Value	
+		Signal name	Input/ Output		(Approx.)	
1 (LW)	108 (B)	Throttle control motor (Open)	Output	[Ignition switch: ON] • Engine stopped • Shift lever: D (CVT), 1st (M/T) • Accelerator pedal: Fully depressed	0-14V* 1mSec/div FULLION 5V/div JMBIA0324GB	
2 (R/Y)	108 (B)	Throttle control motor relay power supply	Input	[Ignition switch: ON]	BATTERY VOLTAGE (11.– 14 V)	

## < ECU DIAGNOSIS >

[MR20DE]

Termin (Wire		Description		Condition	Value
+		Signal name	Input/ Output		(Approx.)
3 (L/G)	108 (B)	Heated oxygen sensor 1 heater	Output	<ul> <li>[Engine is running]</li> <li>Warm-up condition</li> <li>Engine speed: Below 3,400 rpm</li> </ul>	10 V★ 50mSec/div 50mSec/div 10V/div JMBIA03250B
				[Ignition switch: ON] • Engine stopped [Engine is running] • Engine speed: Above 3,400 rpm	BATTERY VOLTAGE (11 – 14 V)
4 (P)	108 (B)	Throttle control motor (Close)	Output	[Ignition switch: ON] • Engine stopped • Shift lever: D (CVT), 1st (M/T) • Accelerator pedal: Fully released	0 - 14 V* 5mSec/div
5 (R)	108 (B)	Heated oxygen sensor 2 heater	Output	<ul> <li>[Engine is running]</li> <li>Engine speed: Below 3,600 rpm after the following conditions are met</li> <li>Engine: after warming up</li> <li>Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load</li> </ul>	10 V★ 50mSec/div 10V/div JMBIA0325GB
				[Ignition switch: ON] • Engine stopped [Engine is running] • Engine speed: Above 3,600 rpm	BATTERY VOLTAGE (11 – 14 V)
9	108	EVAP canister purge volume	Output	[Engine is running] • Idle speed	BATTERY VOLTAGE (11 – 14V)★ 50mSec/div € 10V/div JMBIA0327GB
(W/B)	(B)	control solenoid valve		<ul> <li>[Engine is running]</li> <li>Engine speed: About 2,000 rpm (More than 100 seconds after starting engine.)</li> </ul>	10 V★ 50mSec/div 10 V★ 10 V★ 10 V/div JMBIA0328GB
10 (B)		ECM ground			_
11 (B/W)	_	ECM ground	<u> </u>	-	_

021-62999292

•

# < ECU DIAGNOSIS >

## [MR20DE]

Termin (Wire (		Description			Value
+	-	Signal name	Input/ Output	Condition	(Approx.)
15 (G/L)	108 (B)	Throttle control motor relay	Output	[Ignition switch: OFF]	BATTERY VOLTAGE (11 – 14 V)
17 (L/Y)		Ignition signal No. 1		[Ignition switch: ON] [Engine is running]	0 – 1.0 V 0 – 0.3 V★ 50mSec/div
18 (BR/Y)	108	Ignition signal No. 2		<ul> <li>Warm-up condition</li> <li>Idle speed NOTE: The pulse cycle changes depending on rpm at idle</li> </ul>	2V/div JMBIA0329GB
21 * (R/G)	(B)	Ignition signal No. 4	Output	[Engine is running]	0.2 – 0.5 V★ 50mSec/div
22 (Y)		Ignition signal No. 3	•	<ul> <li>Warm-up condition</li> <li>Engine speed: 2,500 rpm</li> </ul>	2V/div JMBIA0330GE
23 (B/O)	108 (B)	Fuel pump relay	Output	<ul> <li>[Ignition switch: ON]</li> <li>For 1 second after turning ignition switch ON</li> <li>[Engine is running]</li> </ul>	0 – 1.0 V
محدو	ليت	و سامانه (مسئو	خودروس	<ul> <li>[Ignition switch: ON]</li> <li>More than 1 second after turning ignition switch ON</li> </ul>	BATTERY VOLTAGE (11 – 14 V)
25 (R/O)	درود	Fuel injector No. 4	جيتال	🔍 اولین سامانه دی	BATTERY VOLTAGE (11 – 14 V)★
29 (O)		Fuel injector No. 3		<ul> <li>[Engine is running]</li> <li>Warm-up condition</li> <li>Idle speed</li> <li>NOTE:</li> <li>The pulse cycle changes depending on rpm at idle</li> </ul>	
30 (GR)	108 (B)	Fuel injector No. 2	Output		BATTERY VOLTAGE (11 – 14 V)★
31 (L)		Fuel injector No. 1		<ul><li>[Engine is running]</li><li>Warm-up condition</li><li>Engine speed: 2,000 rpm</li></ul>	50mSec/div
32 (Y/L)		ECM relay (Self shut-off)	Output	[Engine is running] [Ignition switch: OFF] • A few seconds after turning ignition switch OFF	0 – 1.0 V
				<ul> <li>[Ignition switch: OFF]</li> <li>More than a few seconds after turning ignition switch OFF</li> </ul>	BATTERY VOLTAGE (11 – 14 V)

021-62999292

----

[MR20DE]

# < ECU DIAGNOSIS >

Termin (Wire		Description		Condition	Value	,
+		Signal name	Input/ Output	Condition	(Approx.)	
33	36	Throttle position sensor 1	Input	[Ignition switch: ON] • Engine stopped • Shift lever: D (CVT), 1st (M/T) • Accelerator pedal: Fully released	More than 0.36 V	Ш
(V/W)	(B)			[Ignition switch: ON] • Engine stopped • Shift lever: D (CVT), 1st (M/T) • Accelerator pedal: Fully depressed	Less than 4.75 V	I
34	36		Input	[Ignition switch: ON] • Engine stopped • Shift lever: D (CVT), 1st (M/T) • Accelerator pedal: Fully released	Less than 4.75 V	
(L/R)	(B)	Throttle position sensor 2	Input	[Ignition switch: ON] • Engine stopped • Shift lever: D (CVT), 1st (M/T) • Accelerator pedal: Fully depressed	More than 0.36 V	
36 (B)	_	Sensor ground (Throttle position sensor)		<u> </u>	_	
37 (W)	40 (B/W)	Knock sensor	Input	[Engine is running] • Idle speed	2.5 V	
<sup>-</sup> 38 (P)	44 (W/G)	Engine coolant temperature sensor	Input	[Engine is running]	0 – 4.8 V Output voltage varies with engine coolant temperature.	
40 (B/W)		Sensor ground (Knock sensor)	خەد	شكت ديجيتان		
41 (G/P)	48 (R/L)	Refrigerant pressure sensor	Input	<ul> <li>[Engine is running]</li> <li>Warm-up condition</li> <li>Both A/C switch and blower fan motor switch: ON (Compressor operates)</li> </ul>	1.0 – 4.0 V	
44 (W/G)		Sensor ground (Engine coolant temperature sensor)		-	<b>—</b>	
<b>:</b>	•			[Ignition switch: ON] • Engine stopped	0.4 V	
45 (BR)	52 (LG)	Mass air flow sensor	Input	[Engine is running] • Warm-up condition • Idle speed	0.9 – 1.1 V	
(				<ul> <li>[Engine is running]</li> <li>Warm-up condition</li> <li>Engine is revving from idle to about 4,000 rpm</li> </ul>	0.9 – 1.1 V to 2.4 V (Check for lin- er voltage rise in response to en- gine being increased to about 4,000 rpm	
46 (V)	55 (O)	Intake air temperature sen- sor	Input	[Engine is running]	0 – 4.8 V Output voltage varies with intake air temperature.	
48 (R/L)	_	Sensor ground (Refrigerant pressure sen- sor)	-	_	_	_
49 (LG/R)	56 (B/V)	Heated oxygen sensor 1	Input	[Engine is running] • Warm-up condition • Engine speed: 2,000 mm	0 – 1.0 V	

ECM

# www.digitalkhodro.com

# < ECU DIAGNOSIS >

# [MR20DE]

Termir (Wire	ial No. color)	Description		Condition	Value
+		Signal name	Input/ Output	Condition	(Approx.)
50 (Y)	59 (SB)	Heated oxygen sensor 2	Input	<ul> <li>[Engine is running]</li> <li>Revving engine from idle to 3,000 rpm quickly after the following conditions are met</li> <li>Engine: after warming up</li> <li>Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load</li> </ul>	0 – 1.0 V
52 (LG)	-	Sensor ground (Mass air flow sensor)			_
55 (O)	_	Sensor ground (Intake air temperature sen- sor)	_	-	
56 (B/V)	_	Sensor ground (Heated oxygen sensor 1)		-	-
59 (SB)	_	Sensor ground (Heated oxygen sensor 2)	_	-	<u> </u>
61	62	Crankshaft position sensor	Ĵ,	<ul> <li>[Engine is running]</li> <li>Warm-up condition</li> <li>Idle speed NOTE: The pulse cycle changes depending on rpm at idle</li> </ul>	4.0 V★ 5mSec/div 1000000000000000000000000000000000000
(LG/B)	(B/O)	(POS)	Input	سرمت ديجيتان	4.0 V★
رايرا	درود	ں تعمیر کاران خو	جينار	<ul> <li>Engine is running]</li> <li>Engine speed: 2,000 rpm</li> </ul>	2V/div JMBIA03340
62 (B/O)	_	Sensor ground [Crankshaft position sensor (POS)]	-	_	
63 (B/L)	_	Sensor ground [Camshaft position sensor (PHASE)]	_	_	_

## < ECU DIAGNOSIS >

[MR20DE]

	nal No. color)	Description		Condition	Value
+		Signal name	Input/ Output	Condition	(Approx.)
65	63	Carnshaft position sensor		<ul> <li>[Engine is running]</li> <li>Warm-up condition</li> <li>Idle speed</li> <li>NOTE:</li> <li>The pulse cycle changes depending on rpm at idle</li> </ul>	4.0 V★ 10mSec/div 5 2V/div JMBIA0225GB
(GR/L)	(B/L)	(PHASE)	Input	[Engine is running] • Engine speed is 2,000 rpm	4.0 V★ 10mSec/div 4.0 V★ 10mSec/div 2V/div JMBIA0314GB
69	108	PNP switch	Input	[Ignition switch: ON] • Shift lever: P or N (CVT), Neutral (M/T)	BATTERY VOLTAGE (11 – 14 V)
(W/B)	(B)		mpar	[Ignition switch: ON] <ul> <li>Shift lever: Except above</li> </ul>	0 V
72 (L/O)	36 (B)	Sensor power supply (Throttle position sensor)		[Ignition switch: ON]	5 V
محد	ليت	رو سامانه (مسئو	خود	[Engine is running] • Warm-up condition • Idle speed	BATTERY VOLTAGE (11 – 14 V)
73 (Y/R)	108 (B)	Intake valve timing control solenoid valve	Output	<ul> <li>(Engine is running)</li> <li>Warm-up condition</li> <li>When revving engine up to 2,500 rpm quickly</li> </ul>	0 – 14 V*
74 (Y/W)	48 (R/L)	Sensor power supply (Refrigerant pressure sen- sor)		[Ignition switch: ON]	5 V
75 (L/W)	62 (B/O)	Sensor power supply [Crankshaft position sensor (POS)]	_	[Ignition switch: ON]	5 V
78 (Y/V)	63 (B/L)	Sensor power supply [Camshaft position sensor (PHASE)]	_	[Ignition switch: ON]	5 V
83 (P)	-	CAN communication line	Input/ Output	_	<u> </u>
84 (L)	_	CAN communication line	Input/ Output		-
88 (O)		Data link connector	Input/ Output		
93 (W/L)	108 (B)	Ignition switch	Input	[Ignition switch: OFF] [Ignition switch: ON]	0 V BATTERY VOLTAGE (11 – 14 V)

021-62999292

3

[MR20DE]

# < ECU DIAGNOSIS >

Termin (Wire (		Description		Condition	Value	
+	-	Signal name	Input/ Output	Condition	(Approx.)	
				[Ignition switch: ON] • ASCD steering switch: OFF.	4 V	
				<ul> <li>[Ignition switch: ON]</li> <li>MAIN switch: Pressed</li> </ul>	0 V	
94 (V)	95 (B)	ASCD steering switch	Input	[Ignition switch: ON] <ul> <li>CANCEL switch: Pressed</li> </ul>	1 V	
				<ul> <li>[Ignition switch: ON]</li> <li>RESUME/ACCELERATE switch: Pressed</li> </ul>	3 V	
	,	,	_	[Ignition switch: ON] • SET/COAST switch: Pressed	2 V	
95 (B)		Sensor ground (ASCD steering switch)	_		_	
99 108 Stop la	Stop lamp switch	Input	[Ignition switch: OFF] • Brake pedal: Fully released	0 V		
_(R/W)	(B)	· ·		[Ignition switch: OFF] <ul> <li>Brake pedat: Slightly depressed</li> </ul>	BATTERY VOLTAGE (11 – 14 V)	
100	108	ASCD brake switch		<ul> <li>[Ignition switch: ON]</li> <li>Brake pedal: Slightly depressed (CVT)</li> <li>Brake pedal and/or clutch pedal: Slightly depressed (M/T)</li> </ul>	ov	
(R) محد	(B) ليت	و سامانه (مسئو	ا Input	<ul> <li>[Ignition switch: ON]</li> <li>Brake pedal: Fully released (CVT)</li> <li>Brake pedal and clutch pedal: Fully released (M/T)</li> </ul>	BATTERY VOLTAGE (11 – 14 V)	
102 (BR/Y)	104 (B)	Sensor power supply (Accelerator pedal position sensor 2)	ميتار	[Ignition switch: ON]	5 V .	
103	104	Accelerator pedal position		[Ignition switch: ON] • Engine stopped • Accelerator pedal: Fully released	0.3 – 0.6 V	
(GR)	(B)	sensor 2	sensor 2	Input	[Ignition switch: ON] • Engine stopped • Accelerator pedal: Fully depressed	1.95 – 2.4 V
104 (B)		Sensor ground (Accelerator pedal position sensor 2)	_	_	_	
105 (G)	108 (B)	Power supply for ECM	Input	[Ignition switch: ON]	BATTERY VOLTAGE (11 – 14 V)	
106 (O)	111 (B/Y)	Sensor power supply (Accelerator pedal position sensor 1)	-	[Ignition switch: ON]	5 V	
108 (B)	_	ECM ground	. –	_	-	
110	111	Accelerator pedal position	Input	[Ignition switch: ON] • Engine stopped • Accelerator pedal: Fully released	0.6 – 0.9 V	
(W)	(B/Y)	sensor 1	mput	[Ignition switch: ON] • Engine stopped • Accelerator pedal: Fully depressed	3.9 – 4.7 V	
111 (B/Y)		Sensor ground (Accelerator pedal position sensor 1)	-	_	_	

021-62999292









021-62999292

021-62999292

Ρ



021-62999292



Fail Safe

NON DTC RELATED ITEM

021-62999292

021-62999292

Ρ

JMBWA0023GI

INFC/D:000000004900069

# < ECU DIAGNOSIS >

# [MR20DE]

Engine operating condi- tion in fail-safe mode	Detected items	Remarks	Reference page
Engine speed will not rise more than 2,500 rpm due to the fuel cut	Malfunction indicator circuit	When there is an open circuit on MIL circuit, the ECM cannot warn the driver by lighting up MIL when there is malfunction on engine control system. Therefore, when electrical controlled throttle and part of ECM related diagnoses are continuously detected as NG for 5 trips, ECM warns the driver that engine control system malfunctions and MIL circuit is open by means of operating fail-safe function. The fail-safe function also operates when above diagnoses except MIL circuit are detected and demands the driver to repair the malfunction.	<u>EC-254</u>

### DTC RELATED ITEM

DTC No.	Detected items	Engine operatin	g condition in fail-safe mode
P0011	Intake valve timing control	The signal is not energized to the intak control does not function.	e valve timing control solenoid valve and the valve
P0102 P0103	Mass air flow sensor circuit	Engine speed will not rise more than 2	2,400 rpm due to the fuel cut.
P0117	Engine coolant tempera-	Engine coolant temperature will be de	termined by ECM based on the following condition.
P0118	ture sensor circuit	Condition	Engine coolant temperature decided
	•	Just as ignition switch is turned ON or START	40°C (104°F)
		Approx. 4 minutes or more after engine starting	80°C (176°F)
		Except as shown above	40 - 80°C (104 - 176°F) (Depends on the time)
	و سامانه (مسئول	When the fail-safe system for engine of fan operates while engine is running.	coolant temperature sensor is activated, the cooling
P0122 P0123 P0222 P0223 P2135	Throttle position sensor	order for the idle position to be within	control actuator in regulating the throttle opening in +10 degrees. d of the throttle valve to be slower than the normal
P0500	Vehicle speed sensor	When the fail-safe system for vehicle (Highest) while engine is running.	speed sensor is activated, the cooling fan operates
P0605	ECM	(When ECM calculation function is ma ECM stops the electric throttle control fixed opening (approx. 5 degrees) by ECM deactivates ASCD operation.	actuator control, throttle valve is maintained at a
P1121	Electric throttle control ac- tuator	malfunction:)	r does not function properly due to the return spring lator by regulating the throttle opening around the ot rise more than 2,000 rpm.
			fail-safe mode is not in specified range:) rol actuator by regulating the throttle opening to 20
		engine stalls.	is stuck open:) wn gradually by fuel cut. After the vehicle stops, the ), Neutral (M/T) position, and engine speed will not
P1122	Electric throttle control function	ECM stops the electric throttle contro fixed opening (approx. 5 degrees) by	l actuator control, throttle valve is maintained at a the return spring.
P1124 P1126	Throttle control motor relay	ECM stops the electric throttle contro fixed opening (approx. 5 degrees) by	actuator control, throttle valve is maintained at a

[MR20DE]

INFOID:000000004900070

F

G

M

N

0

Ρ

# www.digitalkhodro.com

ECM

### < ECU DIAGNOSIS >

### DTC No. Detected items Engine operating condition in fail-safe mode A P1128 ECM stops the electric throttle control actuator control, throttle valve is maintained at a Throttle control motor fixed opening (approx. 5 degrees) by the return spring. ECM stops the electric throttle control actuator control, throttle valve is maintained at a P1229 Sensor power supply EC fixed opening (approx. 5 degrees) by the return spring. P1805 Brake switch ECM controls the electric throttle control actuator by regulating the throttle opening to a small range. С Therefore, acceleration will be poor. **Driving condition** Vehicle condition When engine is idling Normal D When accelerating Poor acceleration P2122 The ECM controls the electric throttle control actuator in regulating the throttle opening in Accelerator pedal position P2123 sensor order for the idle position to be within +10 degrees. Ε P2127 The ECM regulates the opening speed of the throttle valve to be slower than the normal P2128 condition. P2138 So, the acceleration will be poor.

### DTC Inspection Priority Chart

If some DTCs are displayed at the same time, perform inspections one by one based on the following priority chart.

Priority	Detected items (DTC)		
1	U1000 U1001 CAN communication line	·	
	U1010 CAN communication		
	P0102 P0103 Mass air flow sensor		
	P0112 P0113 Intake air temperature sensor		
	P0117 P0118 Engine coolant temperature sensor		
000	• P0122 P0123 P0222 P0223 P1225 P1226 P2135 Throttle position sensor		
~~~ '	P0327 P0328 Knock sensor		
	<ul> <li>P0335 Crankshaft position sensor (POS)</li> </ul>		
	P0340 Camshaft position sensor (PHASE)		
وراب	P0500 Vehicle speed sensor		
	• P0605 ECM		
	<ul> <li>P0705 Park/neutral position (PNP) switch</li> </ul>		
	P1229 Sensor power supply		
	• P1610 - P1615 NATS		
	<ul> <li>P1706 Park/Neutral position (PNP) switch</li> </ul>	,	
	P2122 P2123 P2127 P2128 P2138 Accelerator pedal position sensor		

EĊM

# www.digitalkhodro.com.

# < ECU DIAGNOSIS >

[MR20DE]

Priority	Detected items (DTC)
2 .	<ul> <li>P0132 P0133 P0134 P1143 P1144 Heated oxygen sensor 1</li> <li>P0135 Heated oxygen sensor 1 heater</li> <li>P0138 P0139 P1146 P1147 Heated oxygen sensor 2</li> <li>P0141 Heated oxygen sensor 2 heater</li> <li>P0444 EVAP canister purge volume control solenoid valve</li> <li>P0710 P0715 P0720 P0740 P0744 P0745 P0746 P0776 P0778 P0840 P0845 P1740 P1777 P1778 CVT related sensors solenoid valves and switches</li> <li>P1111 Intake valve timing control solenoid valve</li> <li>P1122 Electric throttle control function</li> <li>P1124 P1126 Throttle control motor relay</li> <li>P1217 Engine over temperature (OVERHEAT)</li> <li>P1805 Brake switch</li> </ul>
3	<ul> <li>P0011 Intake valve timing control</li> <li>P0171 P0172 Fuel injection system function</li> <li>P0300 - P0304 Misfire</li> <li>P0420 Three way catalyst function</li> <li>P1121 Electric throttle motor actuator</li> <li>P1211 TCS control unit</li> <li>P1212 TCS communication line</li> <li>P1564 ASCD steering switch</li> <li>P1572 ASCD brake switch</li> <li>P1574 ASCD vehicle speed sensor</li> <li>P1715 Primary speed sensor</li> </ul>

DTC Index

INFOID:000000004900071

x:Applicable -: Not applicable

						ru pprodoto	. Not applicable
DTC		Items	, SRT code	Test value/ Test limit	Trip	MIL	Reference
GST*2	ECM* <sup>3</sup>	نال خودرو سامانا	نديدن	(GST only)		D.	page
U1000	1000	CAN COMM CIRCUIT	_	_	1	×	EC-87
U1001	1001	CAN COMM CIRCUIT	رس <del>ا</del> مانا	ulat I	2	-	<u>EC-87</u>
U1010	1010	CONTROL UNIT(CAN)	_		1 (CVT) 2 (M/T)	× (CVT) — (M/T)	<u>EC-88</u>
P0000	0000	NO DTC IS DETECTED. FURTHER TESTING MAY BE REQUIRED.	_		·	Flashing	_
P0011	0011	INT/V TIM CONT-B1	—		2	_	<u>EC-89</u>
P0102	0102	MAF SEN/CIRCUIT-B1	_		1	×	EC-92
P0103	0103	MAF SEN/CIRCUIT-B1	. —.	—	<u> </u>	×	EC-92
P0112	0112	IAT SEN/CIRCUIT-B1	—	<u> </u>	2	×	EC-96
P0113	0113	IAT SEN/CIRCUIT-B1	-		2	×	EC-96
P0117	0117	ECT SEN/CIRC	-		- 1	×	EC-99
P0118	0118	ECT SEN/CIRC			1	×	EC-99
P0122	0122	TP SEN 2/CIRC-B1	-	_	1	×	EC-102
P0123	0123	TP SEN 2/CIRC-B1	-	· <b>—</b>	1	×	EC-102
P0132	0132	HO2S1 (B1)	-	×	2	×	EC-105
P0133	0133	HO2S1 (B1)	×	×	2	×	EC-108
P0134	0134	HO2S1 (B1)		×	2	· ×	EC-112
P0135	0135	HO2S1 HTR (B1)	×	×	2	×	EC-115
P0138	0138	HO2S2 (B1)	-	×	2	×	EC-118
P0139	0139	HO2S2 (B1)	×	×	2	. ×.	EC-122
P0141	0141	HO2S2 HTR (B1)	×	×	2	×	EC-126

021-62999292

# < ECU DIAGNOSIS >

# [MR20DE]

DTO	1	- Items	SRT code	Test value/ Test limit	Trip	MIL	Reference page	A
GST*2	ECM*3			(GST only)				
P0171	0171	FUEL SYS-LEAN-B1		—	2	×	<u>EC-129</u>	. =0
P0172	0172	FUEL SYS-RICH-B1		<u> </u>	2	×	EC-133	EC
P0222	0222	TP SEN 1/CIRC-B1		—	1	×	EC-137	
P0223	0223	TP SEN 1/CIRC-B1			1	×	EC-137	- c
P0300	0300	MULTICYL MISFIRE	·	_	2	×	<u>EC-140</u>	
P0301	0301	CYL 1 MISFIRE	_	_	2	×	<u>EC-140</u>	
P0302	0302	CYL 2 MISFIRE	-	_	2	×	<u>EC-140</u>	_ D
P0303	0303	CYL 3 MISFIRE		_	2	×	EC-140	-
P0304	0304	CYL 4 MISFIRE	· — ·		· 2	×	EC-140	- E
P0327	0327	KNOCK SEN/CIRC-B1	<u> </u>	_	2		<u>EC-145</u>	
P0328	0328	KNOCK SEN/CIRC-B1	_		2	-	<u>EC-145</u>	-
P0335	0335	CKP SEN/CIRCUIT			2	×	EC-147	_ F
P0340	0340	CMP SEN/CIRC-B1		_	2	×	EC-151	-
P0420	0420	TW CATALYST SYS-B1	×	×	2	×	EC-155	- ~
P0444	0444	PURG VOLUME CONT/V	-	—	2	×	<u>EC-159</u>	- G
P0500	0500	VEH SPEED SEN/CIRC*4	_	-	2	×	EC-161	
P0605	0605	ECM		-	1 or 2	× or —	EC-162	- н
P0705	0705	PNP SW/CIRC		_	2	×	<u>TM-4</u>	
P0710	0710	ATF TEMP SEN/CIRC	<u> </u>	_		×	<u>TM-4</u>	
P0715	0715	INPUT SPD SEN/CIRC	-	2	2	×	TM-4	
P0720	0720	VEH SPD SEN/CIR AT*4		سرمد	2	×	TM-4	
P0740	0740	TCC SOLENOID/CIRC	_	_	2	×	TM-4	- J
P0744	0744	A/T TCC S/V FNCTN	<u> بەر مانان</u>		2	×	TM-4	
P0745	0745	L/PRESS SOL/CIRC	_	-	2	×	<u>TM-4</u>	-
P0746	0746	PRS CNT SOL/A FCTN	—		1	· <b>x</b>	<u>TM-4</u>	- K
P0776	0776	PRS CNT SOL/B FCTN	_	·	2	×	<u>TM-4</u>	
P0778	0778	PRS CNT SOL/B CIRC	_	_	2	×	<u>TM-4</u>	- L
P0840	0840	TR PRS SENS/A CIRC	_		2	×	TM-4	
P0845	0845	TR PRS SENS/B CIRC	_	_	2	×	<u>TM-4</u>	-
P1111	1111	INT/V TIM C/CIRC	_		2	×	EC-164	- M
P1121	1121	ETC ACTR - B1	-		1	, ×	EC-167	-
P1122	1122	ETC FUNCTION/CIRC - B1		, <u> </u>	1	×	EC-169	N
P1124	1124	ETC MOT PWP			1	×	EC-173	
P1126	1126	ETC MOT PWP - B1	_		1	×	EC-173	•
P1128	1128	ETC MOT - B1	·	_	1	×	EC-176	- O
P1143	1143	HO2S1 (B1)	×	×	2	×	EC-178	-
P1144	1144	HO2S1 (B1)	×	×.	2	×	EC-181	- - P
P1146	1146	HO2S2 (B1)	×	×	2	×	<u>EC-184</u>	- r
P1147	1147	HO2S2 (B1)	×	×	2	×	EC-188	
P1211	1211	TCS C/U FUNCTN			2		EC-192	-
P1212	1212	TCS/CIRC	_		2		EC-193	-
P1217	1217	ENG OVER TEMP	<u> </u>		1	×	EC-194	-
P1225	1225	CTP LEARNING-B1	_	<u> </u>	2		EC-198	-

### < ECU DIAGNOSIS >

### [MR20DE]

DT	C* <sup>1</sup>	- Items	SRT code	Test value/ Test limit	Trip	MIL	Reference
GST⁺ <sup>2</sup>	ECM*3			(GST only)		1	page
P1226	1226	CTP LEARNING-B1		_	2	_	EC-200
P1229	1129	SENSOR POWER/CIRC	_		1	×	EC-202
P1564	1564	ASCD SW	·	_	1		EC-204
P1572	1572	ASCD BRAKE SW	-	-	1	_	EC-207
P1574	1574	ASCD VHL SPD SEN			1	_	EC-213
P1610	1610	LOCK MODE		_	2	_	<u>SEC-7</u> SEC-72
P1611	1611	ID DISCARD IMM-ECM			2	_	SEC-7 SEC-72
P1612	1612	CHAIN OF ECM-IMMU	_		2		SEC-7 SEC-72
P1614	1614	CHAIN OF IMMU-KEY	_	<u> </u>	2	-	<u>SEC-7</u> SEC-72
P1615	1615	DIFFERENCE OF KEY	_ ·		2		<u>SEC-7</u> <u>SEC-72</u>
P1706	1706	P-N POS SW/CIRCUIT			2	×	EC-215
P1715	1715	IN PULY SPEED		_	2	_	EC-217
P1740	. 1740	LU-SLCT SOL/CIRC		_	2	×	TM-4
P1777	1777	STEP MOTOR CIRC		-	1	×	IM-4
P1778	1778	STEP MOTOR FNCT			2	×	TM-4
P1805	1805	BRAKE SW/CIRCUIT	—	_	2	-	EC-218
P2122	2122	APP SEN 1/CIRC	LOT SI	"JSL <del>it</del> i	1	×	EC-221
P2123	2123	APP SEN 1/CIRC		_	1	×	EC-221
P2127	2127	APP SEN 2/CIRC	T	—	1	×	EC-224
P2128	2128	APP SEN 2/CIRC		1279L	1	×	EC-224
P2135	2135	TP SENSOR-B1	-	· _	1	. ×	EC-228
P2138	2138	APP SENSOR	_	··	1	x	EC-231

\*1: 1st trip DTC No. is the same as DTC No.

\*2: This number is prescribed by ISO 15031-6.

\*3: In Diagnostic Test Mode II (Self-diagnostic results), this number is controlled by NISSAN.

\*4: When the fail-safe operations for both self-diagnoses occur, the MIL illuminates.

### How to Set SRT Code

INFOID:000000004900072

To set all SRT codes, self-diagnosis for the items indicated above must be performed one or more times. Each diagnosis may require a long period of actual driving under various conditions.

The most efficient driving pattern in which SRT codes can be properly set is explained on the following figure. The driving pattern should be performed one or more times to set all SRT codes.

### DRIVING PATTERN

 The time required for each diagnosis varies with road surface conditions, weather, altitude, individual driving habits, etc.

Zone A refers to the range where the time, required for the diagnosis under normal conditions\*, is the shortest.

- Zone B refers to the range where the diagnosis can still be performed if the diagnosis is not completed within zone A.
- \*: Normal conditions refer to the following:
- Sea level
- Flat road
- Ambient air temperature: 20 30°C (68 86°F)
- Diagnosis is performed as quickly as possible under normal conditions.

### 021-62999292

### EC-274

< ECU DIAGNOSIS >	[MR20DE]
Under different conditions [For example: ambient air temperature other the sis may also be performed. Pattern 1:	nan 20 - 30°C (68 - 86°F)], diagno- A
<ul> <li>The engine is started at the engine coolant temperature of -10 to 35° (where the voltage between the ECM terminals 38 and 44 is 3.0 - 4.3)</li> <li>The engine must be operated at idle speed until the engine coolant t (158°F) (where the voltage between the ECM terminals 38 and 44 is 16)</li> </ul>	/). temperature is greater than 70°C
<ul> <li>Pattern 2:</li> <li>When steady-state driving is performed again even after it is interrupted, In this case, the time required for diagnosis may be extended.</li> </ul>	each diagnosis can be conducted. C
<ul> <li>*1: Depress the accelerator pedal until vehicle speed is 90 km/h (56 MPH), and keep it released for more than 10 seconds. Depress the accelerator pe (56 MPH) again.</li> <li>*2: Checking the vehicle speed with GST is advised.</li> </ul>	
Test Value and Test Limit	INFOID:000000004900073
The following is the information specified in Service \$06 of ISO 15031-5. The test value is a parameter used to determine whether a system/circuit being monitored by the ECM during self-diagnosis. The test limit is a refere maximum or minimum value and is compared with the test value being mor	nce value which is specified as the

maximum or minimum value and is compared with the test value being monitored. These data (test value and test limit) are specified by Test ID (TID) and Component ID (CID) and can be displayed on the GST screen.

SRT item	Self-diagnostic test item	DTC		value display)	Test limit	
			TID	CID		
		P0420	01H	01H	Max.	
CATALYST	Three way catalyst function	P0420	02H	81H	Min.	
وليت مخ	یتال خودر و سامانه (مسئر	P0133	09H	04H	Max.	
		P1143	0AH	84H	Min.	
در مدر اب	Heated oxygen sensor 1	P1144	овн .	04H	Max.	
		P0132	0CH	04H	Max.	
HO2S		P0134	0DH	04H	Max.	
		P0139	19H	86H	Min.	
		P1147	1AH	86H	Min.	
	Heated oxygen sensor 2	P1146	1BH	06H	. Max.	
		P0138	1CH	06H	Max.	
		Dotos	29H	08H	Max.	
	Heated oxygen sensor 1 heater	P0135	2AH	88H	Min.	
HO2S HTR		D0141	2DH	0AH	Max.	
	Heated oxygen sensor 2 heater	P0141	2EH	8AH	Min.	

Ρ

G

021-62999292

# ENGINE CONTROL SYSTEM

< SYMPTOM DIAGNOSIS >

### Endine Contribe 3131

www.digitalkhodro.com.

[MR20DE]

# SYMPTOM DIAGNOSIS ENGINE CONTROL SYSTEM

# Symptom Table

INFO/D:000000004900074

### SYSTEM — BASIC ENGINE CONTROL SYSTEM

<u></u>				·			SY	<b>MPT</b>	DM						
		HARD/NO START/RESTART (EXCP. HA)	ENGINE STALL	HESITATION/SURGING/FLAT SPOT	SPARK KNOCK/DETONATION	LACK OF POWER/POOR ACCELERATION	HIGH IDFE/FOM IDFE	ROUGH IDLE/HUNTING	IDLING VIBRATION	SLOW/NO RETURN TO IDLE	OVERHEATS/WATER TEMPERATURE HIGH	EXCESSIVE FUEL CONSUMPTION	EXCESSIVE OIL CONSUMPTION	BATTERY DEAD (UNDER CHARGE)	Reference page
Warranty	y symptom code	AA	AB	AC	AD	AE	AF	AG	AH	AJ	AK	AL	AM	HA	
Fuel	Fuel pump circuit	1	1	2	3	2		2	2			3		2	EC-246
	Fuel pressure regulator system	. 3	3	4	4	4	4	4	4	4		4			EC-287
امحد	Fuel injector circuit	يو د	21	2	3	2	ركت	2	2			2			EC-244
	Evaporative emission system	3	3	4	4	4	4	4	4	4		4			<u>EC-59</u>
Air	Positive crankcase ventilation sys- tem	3	3	4	4	4	4	4	4	4		4	1		<u>EC-255</u>
	Incorrect idle speed adjustment	ĺ					1	1	1	1		1			EC-14
	Electric throttle control actuator	1	1	2	3	3	2	ż	2	2		2		2	EC-167, EC-169
Ignition	Incorrect ignition timing adjustment	3	3	1	1	1		1	· 1			1			EC-14
	Ignition circuit	1	1	2	2	2		2	2			2			EC-249
Main po	wer supply and ground circuit	. 2	2	3	3	3		. 3	3		2	3			EC-84
Mass ai	r flow sensor circuit	1			2									,	EC-92
Engine o	coolant temperature sensor circuit	] '				]	3	1		3		1			EC-99
Heated	oxygen sensor 1 circuit		1	2	3	2		2	2			2			EC-105, EC-108, EC-112, EC-178, EC-181
Throttle	position sensor circuit	-				-	2			2					EC-102, EC-137, EC-198, EC-200, EC-228
Accelera	ator pedal position sensor circuit			3	2	1									EC-221, EC-224, EC-228
Knock s	ensor circuit		·	2								3			EC-145
Cranksh	haft position sensor (POS) circuit	2	2											1	EC-147

< SYMPTOM DIAGNOSIS >

# ENGINE CONTROL SYSTEM

# www.digitalkhodro.com

`-----

[MR20DE]

-						S	MPT	OM	·_ ·	•	_				
· · ·	(A <sup>†</sup>				VTION					E HIGH					
	XCP.		SPOT		ILER/				-	ATUR	NOL	z	RGE)		
	HARD/NO START/RESTART (EXCP. HA)		ING/FLAT S	SPARK KNOCK/DETONATION	LACK OF POWER/POOR ACCELERATION	ш	LING		I TO IDLE	OVERHEATS/WATER TEMPERATURE	EXCESSIVE FUEL CONSUMPTION	OIL CONSUMPTION	BATTERY DEAD (UNDER CHARGE)	Reference page	-
	O START/R	STALL	HESITATION/SURGING/FLAT	NOCK/DE	POWER/F	HIGH IDLE/LOW IDLE	ROUGH IDLE/HUNTING	IDLING VIBRATION	SLOW/NO RETURN TO IDLE	ATS/WATE	IVE FUEL	IVE OIL CO	Y DEAD (U		
	HARD/N(	ENGINE	HESITAT	SPARK K	LACK OF	HIGH IDI	ROUGH		SLOW/N	OVERHE	EXCESS	EXCESSIVE	BATTER	·.	
Warranty symptom code	AA	AB	AC	AD	AE	AF	AG	AH	AJ	AK	AL	AM	НА		
Camshaft position sensor (PHASE) circuit	З	2												EC-151	•
Vehicle speed signal circuit		2	3		3	~·~					3			EC-161	•
ECM	2	2	3	3	3	3	3	3	3	3	3			EC-162	•
Intake valve timing control solenoid valve cir- cuit	••	3	2		1	3	2	2	3		3			<u>EC-164</u>	•
PNP switch circuit			3		3		3	3			3		Q	EC-215	
Refrigerant pressure sensor circuit		2			•	3		:	3		4			EC-256	Ì
Electrical load signal circuit							3		1					EC-243	
Air conditioner circuit	2	2	3	3	3	3	3	3	3		3		2	HAC-4 HAC-123	
			4		· · · · · ·									BRC-49	ſ

SYSTEM --- ENGINE MECHANICAL & OTHER

K

L

М

Ν

0

Ρ



# **ENGINE CONTROL SYSTEM**

# www.digitalkhodro.com

[MR20DE]

# < SYMPTOM DIAGNOSIS >

		<del>.</del> ,	,,,	,	,		S	(MPT)	OM				1		
		HARD/NO START/RESTART (EXCP. HA)	ENGINE: STALL	HESITATION/SURGING/FLAT SPOT	SPARK KNOCK/DETONATION	LACK OF POWER/POOR ACCELERATION	HIGH IDLE/LOW IDLE	ROUGH IDLE/HUNTING	IDLING VIBRATION	SLOW/NO RETURN TO IDLE	OVERHEATS/WATER TEMPERATURE HIGH	EXCESSIVE FUEL CONSUMPTION	EXCESSIVE OIL CONSUMPTION	BATTERY DEAD (UNDER CHARGE)	Reference page
Warranty sy	ymptom code	A A	АВ	AC	AD	AE	AF	AG	АН	AJ	АК	AL	AM	НА	
Fuel	Fuel tank Fuel piping	5		5	5	5		5	5			5			<u>FL-13</u> FL-15 EM-157
	Vapor lock	00	5	<b>—</b>											HIXILIYI.
	Valve deposit	_												0	
	Poor fuel (Heavy weight gasoline, Low octane)	5		5	5	5		5	5	0		5			
Air	Air duct						2	1.5					1		EM-146
	Air cleaner	ود	ΡL	بتار	2	30	ردى	, iu				2			EM-146
ودراير	Air leakage from air duct (Mass air flow sensor — electric throttle control actuator)	يتا	5	5	اما	5	لير	5	5	C	-	5			
•	Electric throttle control actuator	5			5		5			5					<u>EM-148</u>
	Air leakage from intake manifold/ Collector/Gasket														
Cranking	Battery	1	1	1		1		1	1			1		1	PG-89
	Generator circuit			ľ				Ľ'						1	CHG-2
	Starter circuit	3		-	]					]		1			STR-2
	Signal plate	6	]							ļ .		1			EM-212
	PNP switch	4													EC-215
Engine	Cylinder head	- 5	5	5	5	5		5	5			- 5		1	EM-193
	Cylinder head gasket			5		5			5		4		3		EIVE 193
	Cylinder block			1			1		, 	1			1	1	
	Piston	]	1										4		
	Piston ring	6	6	6	6	6			6			6		1	EM 004
	Connecting rod	] ິ	<b>°</b>		°	<b>°</b>		6	6		!	6		1	EM-221
	Bearing	]		ĺ		1									
	Crankshaft	1 ·								<b>.</b>					

1

ł

4

Ì

< SYMPTOM DIAGNOSIS >

# ENGINE CONTROL SYSTEM

# www.digitalkhodro.com

[MR20DE]

		ļ	·	1	i —	• • •	3	MPT							
	· · · · · · · · · · · · · · · · · · ·	HARD/NO START/RESTART (EXCP. HA)	IALL	HESITATION/SURGING/FLAT SPOT	SPARK KNOCK/DETONATION	LACK OF POWER/POOR ACCELERATION	HIGH IDLE/LOW IDLE	ROUGH IDLE/HUNTING	BRATION	SLOW/NO RETURN TO IDLE	OVERHEATS/WATER TEMPERATURE HIGH	EXCESSIVE FUEL CONSUMPTION	EXCESSIVE OIL CONSUMPTION	BATTERY DEAD (UNDER CHARGE)	Reference page
		HARD/NO	ENGINE STALL	HESITATIO	SPARK KN	LACK OF F		ROUGH ID	IDLING VIBRATION	SLOW/NO	OVERHEA	EXCESSIV	EXCESSIV	ваттеяу (	
Warranty	symptom code	A	AB	AC	AD	AE	AF	AG	АН	AJ	AK	AL	АМ	НА	
Valve mecha- nism	Timing chain Camshaft						-								EM-173 EM-179
	Intake valve timing control	5	5	5	5	5		5	5			5			<u>EM-164</u>
	Intake valve												3	0	<u>EM-193</u>
Exhaust	Exhaust manifold/Tube/Muffler/ Gasket Three way catalyst	5	5	5	5	5		5	5	Ď		5	9		EM-152 EX-9
Lubrica- tion	Oil pan/Oil strainer/Oil pump/Oil filter/Oil gallery/Oil cooler	99 5	5	5	5	5	رکت البر	5	5	C		5			EM-156 EM-211 LU-17 LU-19
Cooling	Oil level (Low)/Filthy oil Radiator/Hose/Reservoir tank cap										-				<u>LU-14</u> <u>CO-33</u> <u>CO-33</u>
	Thermostat	-								- 5					<u>CO-42</u> <u>CO-45</u>
	Water control valve Water pump	5	5	5	5	5		5	5	1	2	5			<u>CO-39</u>
	Water gallery							,	5						<u>CO-24</u> <u>CO-25</u>
	Cooling fan Coolant level (Low)/Contaminat- ed coolant	-								5					<u>CO-38</u> <u>CO-30</u>
			·						<u> </u>	<u> </u>					SEC-7

6

2

Ρ

### NORMAL OPERATING CONDITION

< SYMPTOM DIAGNOSIS >

NORMAL OPERATING CONDITION

### Description

FUEL CUT CONTROL (AT NO LOAD AND HIGH ENGINE SPEED)

If the engine speed is above 2,400 rpm under no load (for example, the selector lever position is neutral and engine speed is over 2,400 rpm) fuel will be cut off after some time. The exact time when the fuel is cut off varies based on engine speed.

Fuel cut will be operated until the engine speed reaches 1,500 rpm, then fuel cut will be cancelled. **NOTE:** 

This function is different from deceleration control listed under Multiport Fuel Injection (MFI) System, <u>EC-24</u>. <u>"System Diagram"</u>.

# شرکت دیجیتال خودرو سامانه (مسئولیت محدود)

اولین سامانه دیجیتال تعمیرکاران خودر و در ایران

021-62999292

www.digitalkhodro.com

[MR20DE]

INFOID:000000004900075

### PRECAUTIONS

[MR20DE]

А

EC

Ε

F

Н

### < PRECAUTION > PRECAUTION

# PRECAUTIONS

### Precaution for Supplemental Restraint System (SRS) "AIR BAG" and "SEAT BELT PRE-TENSIONER" INFOID:000000004900076

The Supplemental Restraint System such as "AIR BAG" and "SEAT BELT PRE-TENSIONER", used along С with a front seat belt, helps to reduce the risk or severity of injury to the driver and front passenger for certain types of collision. This system includes seat belt switch inputs and dual stage front air bag modules. The SRS system uses the seat belt switches to determine the front air bag deployment, and may only deploy one front D air bag, depending on the severity of a collision and whether the front occupants are belted or unbelted. Information necessary to service the system safely is included in the "SRS AIR BAG" and "SEAT BELT" of this Service Manual.

### WARNING:

- To avoid rendering the SRS inoperative, which could increase the risk of personal injury or death in the event of a collision which would result in air bag inflation, all maintenance must be performed by an authorized NISSAN/INFINITI dealer.
- Improper maintenance, including incorrect removal and installation of the SRS, can lead to personal injury caused by unintentional activation of the system. For removal of Spiral Cable and Air Bag Module, see the "SRS AIR BAG".
- · Do not use electrical test equipment on any circuit related to the SRS unless instructed to in this G Service Manual. SRS wiring harnesses can be identified by yellow and/or orange harnesses or harness connectors.

### PRECAUTIONS WHEN USING POWER TOOLS (AIR OR ELECTRIC) AND HAMMERS

### WARNING:

- · When working near the Air Bag Diagnosis Sensor Unit or other Air Bag System sensors with the ignition ON or engine running, DO NOT use air or electric power tools or strike near the sensor(s) with a hammer. Heavy vibration could activate the sensor(s) and deploy the air bag(s), possibly causing serious injury.
- · When using air or electric power tools or hammers, always switch the ignition OFF, disconnect the battery, and wait at least 3 minutes before performing any service.

### Precaution for Procedure without Cowl Top Cover

the lower end of windshield with urethane, etc.

When performing the procedure after removing cowl top cover, cover



Ŵ

Μ

к

Ł

### On Board Diagnostic (OBD) System of Engine and CVT

The ECM has an on board diagnostic system. It will light up the malfunction indicator lamp (MIL) to warn the driver of a malfunction causing emission deterioration. CAUTION:

- · Be sure to turn the ignition switch OFF and disconnect the negative battery cable before any repair or inspection work. The open/short circuit of related switches, sensors, solenoid valves, etc. will cause the MIL to light up.
- · Be sure to connect and lock the connectors securely after work. A loose (unlocked) connector will cause the MIL to light up due to the open circuit. (Be sure the connector is free from water, grease, dirt, bent terminals, etc.)
- Certain systems and components, especially those related to OBD, may use a new style slide-locking type harness connector. For description and how to disconnect, refer to PG-80. "Description".

PIIB3706J

INFOID-000000004900078

INFOID:000000004900077

N

0

Ρ

< PRECAUTION >

### PRECAUTIONS

### [MR20DE]

INFOID:000000004900079

- Be sure to route and secure the harnesses properly after work. The interference of the harness with a bracket, etc. may cause the MIL to light up due to the short circuit.
- Be sure to connect rubber tubes properly after work. A misconnected or disconnected rubber tube may cause the MIL to light up due to the malfunction of the fuel injection system, etc.
- · Be sure to erase the unnecessary malfunction information (repairs completed) from the ECM and TCM (Transmission control module) before returning the vehicle to the customer.

### **General Precautions**

- Always use a 12 volt battery as power source.
- Do not attempt to disconnect battery cables while engine is running.
- · Before connecting or disconnecting the ECM harness connector, turn ignition switch OFF and disconnect negative battery cable. Failure to do so may damage the ECM because battery voltage is applied to ECM even if ignition switch is turned OFF.
- · Before removing parts, turn ignition switch OFF and then disconnect battery ground cable.
- []@ BATTERY SEF289H



 If a battery cable is disconnected, the memory will return to the ECM value.

The ECM will now start to self-control at its initial value. Engine operation can vary slightly when the terminal is disconnected. However, this is not an indication of a malfunction. Do not replace parts because of a slight variation.

- If the battery is disconnected, the following emission-related diagnostic information will be lost within 24 hours.
- Diagnostic trouble codes
- 1st trip diagnostic trouble codes
- Freeze frame data
- System readiness test (SRT) codes
- Test values
- When connecting ECM harness connector (1), fasten (B) it securely with a lever as far as it will go as shown in the figure.
  - ECM 2
  - A. Loosen

· When connecting or disconnecting pin connectors into or from ECM, take care not to damage pin terminals (bend or break).

Make sure that there are not any bends or breaks on ECM pin terminal, when connecting pin connectors.

- Securely connect ECM harness connectors. A poor connection can cause an extremely high (surge) voltage to develop in coil and condenser, thus resulting in damage to ICs.
- Keep engine control system harness at least 10 cm (4 in) away from adjacent harness, to prevent engine control system malfunctions due to receiving external noise, degraded operation of ICs, etc.



PBI82947E







incidents.

< PRECAUTION >

### PRECAUTIONS

# www.digitalkhodro.com

### [MR20DE]



• After performing each TROUBLE DIAGNOSIS, perform DTC CONFIRMATION PROCEDURE or Component Function Check. The DTC should not be displayed in the DTC Confirmation Procedure if the repair is completed. The Component Function Check should be a good result if the repair is completed.

Keep engine control system parts and harness dry.

· Handle mass air flow sensor carefully to avoid damage.

Do not disassemble electric throttle control actuator.

Refer to EC-258. "Reference Value".

crankshaft position sensor (POS).

 When measuring ECM signals with a circuit tester, never allow the two tester probes to contact. Accidental contact of probes will cause a short circuit and damage the ECM power transistor.

Do not operate fuel pump when there is no fuel in lines.

Tighten fuel hose clamps to the specified torque.

Ρ

### PRECAUTIONS

### < PRECAUTION >

- Do not depress accelerator pedal when starting.
- · Immediately after starting, do not rev up engine unnecessarily.
- Do not rev up engine just prior to shutdown.

### [MR20DE]

www.digitalkhodro.com





• When installing C.B. ham radio or a mobile phone, be sure to observe the following as it may adversely affect electronic 88888 000|**00**0000 SEF708)

- Keep the antenna as far as possible from the electronic control units. - Keep the antenna feeder line more than 20 cm (8 in) away

control systems depending on installation location.

- from the harness of electronic controls. Do not let them run parallel for a long distance.
- Adjust the antenna and feeder line so that the standing-wave ratio can be kept smaller.
- Be sure to ground the radio to vehicle body.



# PREPARATION

# www.digitalkhodro.com

PREPARATION	· · · · ·
REPARATION	
pecial Service Tools	INFC/D:000000004900
	7 7
Tool number	
Tool name	Description
EG17550000 Break-out box	Measuring ECM signals with a circuit tester
O C	1194D
EG17680000	Measuring ECM signals with a circuit tester
Y-cable adapter	
	A8376J Measuring fuel pressure
KV10118400 Fuel tube adapter	Measuring fuel pressure
KV101 <mark>18400</mark> Fuel tube adapter	
KV10118400 Fuel tube adapter	
KV10118400 Fuel tube adapter	
KV10118400 Fuel tube adapter	
<pre>KV10118400 Fuel tube adapter PBI PBI PBI PBI PBI PBI PBI PBI PBI PBI</pre>	Measuring fuel pressure
<pre>KV10118400 Fuel tube adapter PBI PBI PBI PBI PBI PBI PBI PBI PBI PBI</pre>	B3043E
V10118400 Fuel tube adapter	B3043E  NFOID:0000000004900  Description
KV10118400 Fuel tube adapter Dommercial Service Tools	B3043E Measuring fuel pressure
KV10118400 Fuel tube adapter Dommercial Service Tools	Measuring fuel pressure     Measuring fuel pressure     Description     Removing fuel tube quick connectors in engine     room     (Available in SEC. 164 of PARTS CATALOG: Par
KV10118400 Fuel tube adapter Dommercial Service Tools	Measuring fuel pressure     Measuring fuel pressure     Description     Removing fuel tube quick connectors in engine     room
KV10118400 Fuel tube adapter Dommercial Service Tools	Measuring fuel pressure     Measuring fuel pressure     Description     Removing fuel tube quick connectors in engine     room     (Available in SEC. 164 of PARTS CATALOG: Par
KV10118400 Fuel tube adapter Dommercial Service Tools Tool name Quick connector re- lease	Measuring fuel pressure     Measuring fuel pressure     Description     Removing fuel tube quick connectors in engine     room     (Available in SEC. 164 of PARTS CATALOG: Par
KV10118400 Fuel tube adapter Dommercial Service Tools Tool name Quick connector re- ease	Measuring fuel pressure      Measuring fuel pressure      Measuring fuel pressure      Measuring fuel pressure      Measuring fuel tube quick connectors in engine     room     (Available in SEC. 164 of PARTS CATALOG: Par     No. 16441 6N210)      Consee      Removing and installing engine coolant tempera-
KV10118400 Fuel tube adapter Dommercial Service Tools Tool name Quick connector re- lease	Measuring fuel pressure     Measuring fuel pressure     Measuring fuel pressure     Measuring fuel pressure     Measuring fuel tube quick connectors in engine     room     (Available in SEC. 164 of PARTS CATALOG: Par     No. 16441 6N210)
KV10118400 Fuel tube adapter Pel Dommercial Service Tools Tool name Quick connector re- lease	Measuring fuel pressure      Measuring fuel pressure      Measuring fuel pressure      Measuring fuel pressure      Measuring fuel tube quick connectors in engine     room     (Available in SEC. 164 of PARTS CATALOG: Par     No. 16441 6N210)      Consee      Removing and installing engine coolant tempera-

đ

# PREPARATION

www.digitalkhodro.com

[MR20DE]

## < PREPARATION >

Tool name		Description
Oxygen sensor thread cleaner	Mating surface shave cytinder Flutes	Reconditioning the exhaust system threads before installing a new oxygen sensor. Use with anti- seize lubricant shown below. a: 18 mm diameter with pitch 1.5 mm for Zirco- nia Oxygen Sensor b: 12 mm diameter with pitch 1.25 mm for Tita- nia Oxygen Sensor
Anti-seize lubricant i.e.: (Permatex <sup>TM</sup> 133AR or equivalent meeting MIL specifica- tion MIL-A-907)	S-NT779	Lubricating oxygen sensor thread cleaning tool when reconditioning exhaust system threads.

يحيتال خوده

شرکت دیجیتال خودرو سامانه (مسئولیت محدود)

# اولین سامانه دیجیتال تعمیر کاران خودر و در ایران

# **FUEL PRESSURE**

# www.digitalkhodro.com

INFQID:000000004900082

### < ON-VEHICLE MAINTENANCE >

# ON-VEHICLE MAINTENANCE FUEL PRESSURE

Inspection

### FUEL PRESSURE RELEASE

- 1. Remove fuel pump fuse located in IPDM E/R.
- 2. Start engine.
- 3. After engine stalls, crank it two or three times to release all fuel pressure.
- 4. Turn ignition switch OFF.
- 5. Reinstall fuel pump fuse after servicing fuel system.

### FUEL PRESSURE CHECK

### CAUTION:

- · Before disconnecting fuel line, release fuel pressure from fuel line to eliminate danger.
- The fuel hose connection method used when taking fuel pressure check must not be used for other purposes.
- Be careful not to scratch or put debris around connection area when servicing, so that the quick connector maintains seal ability with O-rings inside.
- Do not perform fuel pressure check with electrical systems operating (i.e. lights, rear defogger, A/C, G etc.) Fuel pressure gauge may indicate false readings due to varying engine load and changes in manifold vacuum.

### NOTE:

Prepare pans or saucers under the disconnected fuel line because the fuel may spill out. The fuel pressure cannot be completely released because J10 models do not have fuel return system.

- 1. Release fuel pressure to zero.
- Prepare fuel hose for fuel pressure check B and fuel tube adapter [SST (KV10118400)] D, then connect fuel pressure gauge A.
  - <>: To quick connector
  - - To fuel tube (engine side)
  - · C: Clamp
  - Use suitable fuel hose for fuel pressure check (genuine NIS-SAN fuel hose without quick connector).
  - To avoid unnecessary force or tension to hose, use moderately long fuel hose for fuel pressure check.
  - Do not use the fuel hose for checking fuel pressure with damage or cracks on it.
  - Use Pressure Gauge to check fuel pressure.
- 3. Remove fuel hose.
  - Do not twist or kink fuel hose because it is plastic hose.
- 4. Connect fuel hose for fuel pressure check (1) to fuel tube (engine side) with clamp (2) as shown in the figure.
  - No.2 spool (5)

021-62999292

- Wipe off oil or dirt from hose insertion part using cloth moistened with gasoline.
- Apply proper amount of gasoline between top of the fuel tube (3) and No.1 spool (4).
- Insert fuel hose for fuel pressure check until it touches the No.1 spool on fuel tube.
- Use NISSAN genuine hose clamp (part number: 16439 N4710 or 16439 40U00).
- When reconnecting fuel line, always use new clamps.
- Use a torque driver to tighten clamps.
- Install hose clamp to the position within 1 2 mm (0.04 0.08 in).

Tightening torque: 1 - 1.5 N·m (0.1 - 0.15 kg-m, 9 - 13 in-lb)

EC-287







### 021-62999292

А

EC

С

D

E

F

Н

# FUEL PRESSURE

### -----

# www.digitalkhodro.com

### [MR20DE]

- Make sure that clamp screw does not contact adjacent parts.
- 5. Connect fuel tube adapter to quick connector.
  - A: Fuel pressure gauge

< ON-VEHICLE MAINTENANCE >

- B: Fuel hose for fuel pressure check
- 6. After connecting fuel hose for fuel pressure check, pull the hose with a force of approximately 98 N (10 kg, 22 lb) to confirm fuel tube does not come off.
- 7. Turn ignition switch ON and check for fuel leakage.
- 8. Start engine and check for fuel leakage.
- 9. Read the indication of fuel pressure gauge.
  - Do not perform fuel pressure check with system operating. Fuel pressure gauge may indicate false readings.
  - During fuel pressure check, confirm for fuel leakage from fuel connection every 3 minutes.

### At idling: Approximately 350 kPa (3.5 bar, 3.57 kg/cm<sup>2</sup>, 51 psi)

- 10. If result is unsatisfactory, go to next step.
- 11. Check the following.
  - Fuel hoses and fuel tubes for clogging
  - Fuel filter for clogging
  - Fuel pump
  - · Fuel pressure regulator for clogging

If OK, replace fuel pressure regulator.

If NG, repair or replace.

PB(829849

# EVAPORATIVE EMISSION SYSTEM

# < ON-VEHICLE MAINTENANCE >

# EVAPORATIVE EMISSION SYSTEM

# Inspection

- Visually inspect EVAP vapor lines for improper attachment and for cracks, damage, loose connections, chafing and deterioration.
- 2. Check EVAP canister as follows:
- a. Block port (B). Orally blow air through port (A). Check that air flows freely through port (C).
- b. Block port (A). Orally blow air through port (B). Check that air flows freely through port (C).



- 3. Visually inspect the fuel check valve for cracks, damage, loose connections chafing and deterioration.
- 4. Check fuel check valve as follows:
- a. Blow air through connector on the fuel tank side. A considerable resistance should be felt and a portion of air flow should be directed toward the EVAP canister side.
- b. Blow air through connector on EVAP canister side. Air flow should be smoothly directed toward fuel tank side.
- c. If fuel check valve is suspected or not properly functioning in step 1 and 2 above, replace it.





a. Wipe clean valve housing.





b. Check valve opening pressure and vacuum.

Pressure: 15.3 - 20.0 kPa (0.153 - 0.200 bar, 0.156 - 0.204 kg/ cm<sup>2</sup>, 2.22 - 2.90 psi)

Vacuum:

cm<sup>2</sup>, 2.22 - 2.90 psi) -6.0 to -3.4 kPa (-0.06 bar to -0.034bar, -0.061 to -0.035 kg/cm<sup>2</sup>, -0.87 to -0.49 psi)

c. If out of specification, replace fuel filler cap as an assembly.

А

EC

G

H

[MR20DE]

INFOID:000000004900085

# SERVICE DATA AND SPECIFICATIONS (SDS)

# < SERVICE DATA AND SPECIFICATIONS (SDS)

# SERVICE DATA AND SPECIFICATIONS (SDS) SERVICE DATA AND SPECIFICATIONS (SDS)

# Idle Speed

INFOID:000000004900084

Transmission	Condition	Specification
CVT	No load* (in P or N position)	700 ± 50 rpm
M/T	No load* (in Neutral position)	700 ± 50 mm

\*: Under the following conditions

A/C switch: OFF

· Electric load: OFF (Lights, heater fan & rear window defogger)

· Steering wheel: Kept in straight-ahead position

## **Ignition Timing**

INFOID:000000004900085

Transmission	Condition	Specification
СVТ	No load* (in P or N position)	9±5° BTDC
M/T	No load* (in Neutral position)	9±5° BTDC

\*: Under the following conditions

A/C switch: OFF

Electric load: OFF (Lights, heater fan & rear window defogger)

Steering wheel: Kept in straight-ahead position

### Calculated Load Value

INFOID:000000004900086

INFOID.000000004900097

Condition	Specification (Using GST)
At idle 9,092 (1) (2) (2) (2) (2)	10 - 35 %
At 2,500 rpm	10 – 35 %

### Mass Air Flow Sensor

Supply voltage	Battery voltage (11 – 14 V)
Output voltage at idle	0.9 – 1.1V*
Mass air flow (Using GST)	1.0 – 4.0 g·m/sec at idle* 2.0 – 10.0 g·m/sec at 2,500 pm*

\*: Engine is warmed up to normal operating temperature and running under no load.

### 021-62999292

www.digitalkhodro.com

[MR20DE]